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ABSTRACT

A research project examined the relationship between education and work in the professions of social work and engineering. The project encompassed four main studies of professionals at different career stages. There were (1) a questionnaire and interview study of alumni from the Case Western Reserve University Schools of Engineering and Social Work in five graduating years; (2) a corresponding investigation of current students and teaching methods in these two professions; (3) a project studying engineers and their work environments in two engineering firms; and (4) a study of the experiential learning process. Among those areas addressed in the project were the following: development of an applied theory of experiential learning, assessment of adaptive competencies, assessment of person-environment congruence, the relationship of professional education and career development, and the relationship between careers and adult development. Developed in the study was a system identifying three levels of competence--performance, learning, and developmental competencies. Techniques for assessing each of these levels and for assessing person-environment congruence were developed and tested. Data also indicated that professional education currently prepares professionals better for their core professional role than for lifelong careers and that adult development is marked by a shift from specialization to integration. (MN)

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PROFESSIONAL EDUCATION AND CAREER DEVELOPMENT:
A CROSS SECTIONAL STUDY OF
ADAPTIVE COMPETENCIES IN EXPERIENTIAL LEARNING

Lifelong Learning and Adult Development Project

FINAL REPORT
NIE Grant No. NIE-G-77-0053
April, 1981

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EXECUTIVE SUMMARY

The research reported here examines the relationship between education and work in the professions of social work and engineering. The theory of experiential learning is used to define and assess competencies acquired in professional education and demonstrated in the work setting. Five general areas of research and development were addressed in this research.

1. The development of an applied theory of experiential learning.
2. The development of means for assessing genotypic adaptive competencies.
3. The development of a commensurate system for assessing personal competencies and environmental press.
4. A better understanding of the relationship between preparatory education and career development.
5. A better understanding of the relationship between careers and adult development.

The project encompassed a number of specific research studies of professionals at different career stages. The largest was a questionnaire and interview study of alumni from the Case Western Reserve University Schools of Engineering and Social Work in the graduating years 1955, 1960, 1965, 1970, and 1975. In a second study, a corresponding investigation was made of current students and teaching methods in these two professions. A third project studied engineers and their work environments in two engineering firms. These main studies were supplemented by other investigations of mid-career adults, a mixed group of adult professionals who volunteered for a study of the learning process, a sample of Pennsylvania educators, and Alverno College students.

An Applied Theory of Experiential Learning

Within the theoretical framework of experiential learning a system of competencies was developed. This system identifies three levels of competence--performance competencies, learning competencies and developmental competencies. Performance competencies are goal-oriented skills addressed to task environments that are limited in time and space. Learning competencies can be viewed as learning heuristics that facilitate the acquisition and deployment of generic clusters of performance competencies. The theory of experiential learning identifies four such learning competencies: affective, perceptual, symbolic, and behavioral competence. Developmental competence results from the holistic integration of the specialized learning competencies. The higher order adaptive process that results from this integrated developmental perspective links the choice of specific adaptive strategies to personal integrity and life purpose.

Assessing Adaptive Competencies.

Assessment techniques for each of these three levels of competence were developed and tested in our research. A self-assessment list of performance competencies was developed that had some ecological validity for describing jobs and professional education courses in engineering and social work. These performance competencies also had construct validity in that they were significantly clustered in the predicted four learning competence areas: affective, behavioral, symbolic and perceptual; although the competencies in the perceptual area were not significantly related to learning style as predicted. Learning competencies were assessed via the Learning Style Inventory and the Adaptive Style Inventory, both self-report instruments; and via behavioral tests--the Group Embedded Figures Test and the Perception-Reaction Test. Both the self-report and behavioral indices showed construct validity although they did not significantly correlate with each other indicating a need for further research in this area. Developmental competence was assessed via the concept of adaptive flexibility using the Adaptive Style Inventory. Adaptive flexibility on this instrument was found to be significantly related to ego development and self direction, variety, and flexibility in relationships. High adaptive flexibility seemed to moderate the stress associated with conflict in one's life.

Assessing Person-Environment Congruence

Work on the assessment of educational environments included the further refinement and validation of Fry's system for assessing classroom learning environments using the experiential learning theory framework. In addition, work was begun on the assessment of non-classroom learning environments with particular emphasis on how students choose these learning environments in relation to their personal goals and learning style. A corresponding focus of the research on the assessment of work environments resulted in a questionnaire for defining the affective, perceptive, symbolic, and behavioral press of jobs. By measuring persons and jobs in the commensurate terminology of experiential learning theory, we were able to investigate the impact of matches and mismatches between person and job on performance and satisfaction. In general, our results indicate that individuals whose personal competencies match their job demands have higher performance and satisfaction ratings than do either under-qualified or over-qualified individuals. This is particularly true in those areas of job demand that are pivotal for success in a given job role. The organization climate for growth was found to significantly influence how well the organization succeeded in matching individuals and jobs in these pivotal areas of job demand.

Professional Education and Career Development

Results of our investigation of the relationship between professional education and career development suggest that professional education currently prepares professionals better for their core professional role than for life long careers. Professional education in social work and engineering emphasize preparation in symbolic and perceptual competencies at the expense of affective and behavioral competencies. In engineering, in particular, there is evidence of what we are calling professional deformation--an over-socialization into the professional mentality of engineering that interferes with career adaptation in the transition to managerial jobs. We find, however, on the basis of our interviews with engineering and social work alumni, that there is a general progression from specialization to integration in career orientation as predicted by experiential learning theory. Contrary to Jungian and other psychoanalytic theories, this shift seems not to be caused by personality development but by changes in job demands.

Careers and Adult Development

The shift from specialization to integration is further illustrated by examination of how individuals with different learning styles master the tasks associated with adult development. When we examine how individuals at midlife cope with the life issues facing them, we see a tendency to express and cope with these issues in a way that develops an integrative perspective. The achievement of this perspective seems to require: (1) a balance of life investments, (2) an incorporation of the "shadow self," (3) the development of an harmonious life structure, and (4) achievement of personal centeredness.

ACKNOWLEDGEMENTS

A project of this magnitude generates sources of indebtedness that equal or even exceed the generation of knowledge. First among those to whom we wish to express our gratitude are the alumni of the School of Applied Social Science (SASS) and Case Institute of Technology who gave their time and personal investment to our research by responding, often in great detail, to our questionnaires and by sharing their career experiences with us in the interviews we conducted. Our confidence in the validity of our findings is greatly enhanced by obvious energy and commitment shown by our respondents. Secondly, we are grateful to the faculty and administration of SASS and the engineering school who joined with us in interpreting and understanding the implications of our data. Specifically we appreciate the contributions of Dean Tom Kicher of Case Institute of Technology and of the SASS Faculty Advisory Committee to our project: Professors Marjorie Main, John Yankey, Tom Holland, Ruth Dunkle, Pearl Whitman, Lois Swack, and Claudia Coulton.

We are also indebted to Professor Holland of SASS and Dean Kicher of Case Institute of Technology who, in addition to advising us generally, worked with several of our graduate students on their dissertation research.

Jean Miller, our NIE project director, has been an understanding monitor and incredibly helpful facilitator of the knowledge creation process. Perhaps her major contribution to our work came in bringing us together with the project directors from the other research projects that she was directing in the area of competency based assessment and education. The mutual sharing of frustrations and successes that took place in those meetings not only helped with our specific tasks, but also generated time capsules of tacit knowledge that will continue to "pop" for years to come. In addition, we have new colleagues who undoubtedly will become partners in future research efforts yet to be imagined--Austin Doherty, Marcia Mentkowski, Sheila Huff, Maureen Webster, Willa Pettygrove, George Klemp, Sudhansu Metra, Ken Alvares, and Glenn Varney. We are particularly grateful to Marcia Mentkowski and her research team at Alverno College for administering, scoring, and analyzing data from their students on the Adaptive Style Inventory.

In addition to the contributing authors of this report there were a number of researchers who worked intensively on the project over its life cycle. Christopher Miller joined the project early in its life. In addition to focusing his thesis work on the project objectives, he was instrumental in the creation of data files and facilitating our work with the computer. Hannah Zacks, who was at the time a doctoral student in the School of Applied Social Sciences, worked intensively with the project during the first year and a half of its existence. Her insights and energy are reflected in our work in many ways, not the least of which are her own publications. Miriam Weinstein worked with the project through its existence making many intellectual contributions as well as being a major facilitator and coordinator of project activities. She, too, has written independently on the theory of experiential learning. Mary Ann Hazen contributed to the design and data collection for the professional schools studies.

Finally, we are indebted to Marian Hogue who in the most real sense brought the report all together. She along with Retta Holdorf typed, edited and supervised the production of this report.

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I. Introduction

This report summarizes the results of a two and one half year research project on professional education and career development in the social work and engineering professions. The majority of the studies reported here focused on the careers of social work alumni from the Case Western Reserve University School of Applied Social Science and engineering alumni from the Case Institute of Technology. The overall objective of the research was to study the relationship between professional education and the world of work, viewing this relationship in the context of a lifelong learning process.

The confluence of a number of social trends has created need for basic research on this relationship between education and work. Chief among these social trends are: (1) the ever increasing growth of knowledge and the attendant fragmentation and specialization of disciplines; (2) social and technological changes that render some occupations and careers obsolete while spawning new ones in shorter and shorter time spans; (3) the increasing age of the American population due to decreasing birth rates and advances in the health sciences; and (4) the greater social commitment to equal opportunity and access to all occupations based on one's ability to perform the work rather than an arbitrary criteria such as race, sex, social class, or assessment procedures that base employment decisions on criteria irrelevant to job performance. These trends are causing in all quarters a serious reexamination of the role of traditional educational programs in preparing people for meaningful life and work careers.

Certain conclusions are already apparent from this reexamination process. The "front-loading" of educational experiences in the individual's life span is increasingly questionable. Education and learning must become a continuous process woven throughout the life span providing timely assistance in mastering the developmental challenges and environmental changes of adult life. Today, the labor market of adults changing jobs is over three times that of graduates of higher educational institutions (about 5 million to 1.5 million). In this context, secondary and post-secondary educational experiences should be aimed, not at preparation for jobs, but at preparation for careers. This requires the identification of and preparation for those genotypic adaptive competencies that are suited to the student's career interests, preparing them for continual learning and growth. Preparatory training in phenotypic job skills is becoming less and less cost-effective because of the rapidly changing work environment and changing developmental tasks through one's career. Similarly, counseling and employment assessment strategies based on matching phenotypic skills and interests with specific job tasks are being questioned. The higher level jobs in most careers involve broad, highly complex and changing activities, requiring global skills that seem to defy molecular behavioral analysis. And the current, long overdue trend toward job enrichment and better quality of work life seeks to extend this expansion and flexibility of job definitions down to the lowest organizational levels. Here, again, the solution seems to lie in identification of those genotypic adaptive competencies that will enable individuals to learn the specific skills and attitudes required as they proceed through their careers. In the project we have addressed five general areas of research and development:

1. The development of an applied theory of experiential learning. In situations of high complexity and rapid change the ability to learn becomes the most critical adaptive skill. Learning knowledge, skills and attitudes and learning how to learn these in areas that may require a different learning set or learning style are continual challenges faced by individuals in the course of their careers as they cope with new job responsibilities, new jobs, and new career paths. We need a valid and practical theory of learning that extends beyond the classroom into the world of work; that extends beyond childhood into adulthood. Since the theory must account for adult learning, it must emphasize the importance of experience in the learning process. Individuals cannot be conceived as "tabula rasas" on which habits are stamped in or erased. Rather they must be seen as active interpreters and creators of their own experience. To be useful, knowledge must be both grounded in personal experience and validated in science and theory.

2. The development of means for assessing genotypic adaptive competencies. In our disillusionment with global measures of intelligence and psychological "health" the pendulum has swung toward molecular behavioral analysis of job skills which is, in turn, proving inadequate to cope with predicting career success and change under changing social conditions. What is needed, we believe, are middle level variables assessing genotypic adaptive skills that are associated with the underlying structural demands of various occupational groupings. Valid measures of these competencies are needed at both the self-report and behavioral skill level since career choice is often based as much on what a person thinks he can do as what he actually can do.

3. The development of a commensurate system for assessing personal competencies and environmental press. If we are to determine the impact of matches and mismatches between the genotypic adaptive competencies and job demands, we need a system for describing the demand characteristics of work and learning situations. This system needs to characterize the situations in terms that are commensurate with personal adaptive competencies. In addition, the same system for assessing environmental press should be applicable to both work and learning situations so that relationships between education and work can be explored.

4. A better understanding of the relationships between preparatory education and career development. There has been much philosophical debate and virtually no scientific study of the best way to prepare people for

fulllives and meaningful careers. American higher educational has tended to vary on three major dimensions: the contrast between breadth and depth, the contrast between elective freedom and prescription, and the absolute abundancy vs. scarcity of course offerings (Veysey, 1973). There are strong advocates and detractors for positions on each of these dimensions but few attempts to assess the impact of these educational programs on the later careers of their students (a notable exception in Heath, 1977). Such research, while difficult and time consuming, is essential in order to test our assumptions about the best ways to prepare students for the emerging challenges of adult life. Professional education particularly seems to need examination from this perspective (Schein, 1972).

5. A better understanding of relationships between careers and adult development. Early theories of career development saw definitive career commitments as being made during the period of pre-puberty until the late teens or early 20's. The social trends we have outlined are combining to make this no longer the case (if it ever was). Ginsberg, an early advocate in this view, now states "occupational choice is a process that remains open as long as one makes and expects to make decisions about his work and career. In many cases, it is co-terminous with his working life" (1972, p. 172). Notions about how this choice process occurs are shrouded with popular myths depicting career paths as linear status oriented success ladders. Descriptive research is needed to document the actual complexity of adult career paths; assessing the impact on adult careers of the structure of career paths, the matches and mismatches between personal style and job demands, the changing tasks of adult development (Havinghurst, 198), the impact of physiological and health factors, the increasing importance with age of psychological and social psychological satisfactions and the interrelationships between work life and the rest of the person's life space.

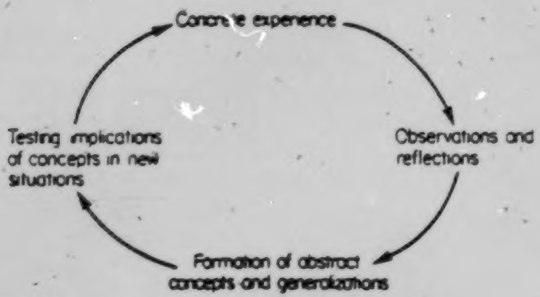
Organization of this report. In the following sections we report the results of our investigations in these five areas. Section II reviews the theory of experiential learning on which this study is based. Section III describes the research studies undertaken and their methodology. Section IV reports the results of our work in the assessment and validation of generic adaptive competencies associated with the theory of experiential learning. Section V reports the results of several studies designed to assess learning and work environment in a way that is commensurate with the adaptive competencies of experiential learning. Section VI reports studies describing the relationships between professional education and career development and Section VII summarizes some of our general conclusions about the course of adult development as viewed by experiential learning theory.

II. Experiential Learning Theory

The focus of this research on the relationships between professional education and career development is on learning as a life-long adaptive process. The framework used to describe the learning process is experiential learning theory. Experiential learning theory provides a model of a learning process that is consistent with the structure of human cognition and the stages of human growth and development. It conceptualizes the learning process in such a way that differences in individual learning styles and corresponding learning environments can be identified. The learning model is a dialectic one, similar to the Jungian (Jung, 1923) concept of styles or types, that states that fulfillment in adult development is accomplished by higher level integration and expression of non-dominant modes of dealing with the world.

The theory is called "experiential learning" for two reasons. The first is historical, tying it to its intellectual origins in the social psychology of Kurt Lewin in the '40's and the sensitivity training and laboratory education work of the '50's and '60's. The second reason is to emphasize the important role that experience plays in the learning process, an emphasis that differentiates this approach from other cognitive theories of the learning process. The core of the model is a simple description of the learning cycle; of how experience is translated into concepts which, in turn, are used as guides in the choice of new experiences.

Figure 2-1: The Experiential Learning Model


Concrete experience
Observations and reflections
Formation of abstract concepts and generalizations
Testing implications of concepts in new situations

Learning is conceived as a four-stage cycle. Immediate concrete experience is the basis for observation and reflection. These observations are assimilated into a "theory" from which new implications for action can be deduced. These implications or hypotheses then serve as guides in acting to create new experiences. The learner, if he is to be effective, needs four different kinds of genotypic adaptive abilities--Concrete Experience abilities (CE), Reflective Observation abilities (RO), Abstract Conceptualization abiliites (AC), and Active Experimentation (AE) abilities. That is, he must be able to involve himself fully, openly, and without bias in new experiences (CE); he must be able to observe and reflect on these experiences from many perspectives (RO); he must be able to create concepts that integrate his observations into logically sound theories (AC); and he must be able to use these theories to make decisions and solve problems (AE). Yet this ideal is difficult to achieve. Can anyone become highly skilled in all of these abilities or are they necessarily in conflict? How can one be concrete and immediate and still be theoretical?

A closer examination of the four-stage learning model would suggest that learning requires abilities that are polar opposites and that the learner, as a result, must continually choose which set of learning abilities he will bring to bear in any specific learning situation. More specifically, there are two primary dimensions to the learning process. The first dimension represents the concrete experience of events at one end and abstract conceptualization at the other. The other dimension has active experimentation at one extreme and reflective observation at the other. Thus, in the process of learning, one moves in varying degrees from actor to observer, from specific involvement to general analytic detachment.

These two dimensions represent the major directions of cognitive development identified by Piaget. In his view, the course of individual cognitive development from birth to adolescence moves from a phenomenolistic (concrete) view of the world to a constructivist (abstract) view and from an egocentric (active) view to a reflective internalized mode of knowing. Piaget also maintains that these have also been the major directions of development in scientific knowledge (Piaget, 1970).

Many other cognitive psychologists (e.g., Bruner, 1960, 1966; Harvey, Hunt and Shroeder, 1961) have identified the concrete/abstract dimension as a primary dimension on which cognitive growth and learning occurs. Goldstein and Scheerer suggest that greater abstractness results in the development of the following abilities:

1. To detach our ego from the outer world or from inner experience.
2. To assume a mental set.
3. To account for acts to oneself; to verbalize the account.
4. To shift reflectively from one aspect of the situation to another.
5. To hold in mind simultaneously various aspects.
6. To grasp the essential of a given whole: to break up a given into parts to isolate and to synthesize them.

7. To abstract common properties reflectively; to form hierarchic concepts.

8. To plan ahead ideationally, to assume an attitude toward the more possible, and to think or perform symbolically (1941, p. 4).

Concreteness, on the other hand, represents according to these theoriests, the absence of these abilities, the immersion in and domination by one's immediate experiences. Yet the circular, dialectic model of the learning process would imply that abstractness is not exclusively good and concreteness exclusively bad. Witkin's (1962, 1973) extensive research on the related cognitive styles of global vs. analytic functioning has shown that both extremes of functioning have their costs and benefits; the analytic style includes competence in analytical functioning combined with an impersonal orientation while the global style reflects less competence in analytic functioning combined with greater social orientation and social skill. Similarly, when we consider the highest form of learning--creativity--we see a requirement that one be able to experience anew, freed somewhat from the constraints of previous abstract concepts. In psychoanalytic theory this need for a concrete childlike perspective in the creative process is referred to as regression in service of the ego (Kris, 1952). Bruner (1966), in his essay on the conditions for creativity, emphasizes the dialectic tension between abstract and concrete involvement. For him the creative act is a product of detachment and commitment, of passion and decorum, and of a freedom to be dominated by the object of one's inquiry.

The active/reflective dimension is the other major dimension of cognitive growth and learning. As growth occurs, thought become more reflective and internalized, based more on the manipulation of symbols and images than overt actions. The modes of active experimentation and reflection, like abstractness/concreteness, stand in opposition to one another. Kagan's (Kagan and Kogan, 1970) research on the cognitive style dimension of reflection/impulsivity suggests that extremes of functioning on this continuum represent opposing definitions of competence and strategies for achieving. The impulsive strategy is based on seeking reward for active accomplishment, while the reflective strategy is based on seeking reward through the avoidance of error. Reflection tends to inhibit action and vice-versa. For example, Singer (1968) has found that children who have active internal fantasy lives are more capable of inhibiting action for long periods of time than are children with little internal fantasy life. Kagan, et al. (1964) have found, on the other hand, that very active orientations toward learning situations inhibit reflection and thereby preclude the development of analytic concepts. Herein lies the second major dialectic in the learning process--the tension between actively testing the implications of one's hypotheses and reflectively interpreting data already collected.

Individual Learning Styles

Over time, accentuation forces operate on individuals in such a way that the dialectic tensions between these dimensions are consistently resolved in a characteristic fashion. As a result of our hereditory equipment, our particular past life experience, and the demands of our present environment, most people develop learning styles that emphasize some learning abilities over others. Through socialization experiences in family, schools, and work we come to resolve the conflicts between being active and reflective and between being immediate and analytical in characteristics ways. Some people develop minds that excel at assimilating disparate facts into coherent theories, yet these same people are incapable of, or uninterested in deducing hypotheses from the theory. Others are logical geniuses but find it impossible to involve and surrender themselves to an experience. And so on. A mathematician may come to place greate emphasis on abstract concepts, while a poet may value concrete experience more highly. A manager may be primarily concerned with the active application of ideas, while a naturalist may develop his observational skills highly. Each of us in a unique way develops a learning style that has some weak and strong points. Evidence for the existence of consistent unique learning styles can be found in the research of both Kagan and Witkin cited earlier (Kagan and Kogan, 1970). They find in support of Piaget that there is a general tendency to become more analytic and reflective with age but that individual rankings within the population tested remain highly stable from early years to adulthood. Thus, individuals seem to develop consistent stable cognitive styles relative to their age mates.

We have developed a brief self-descriptive inventory called the Learning Style Inventory (LSI) to measure differences in learning styles along the two basic dimensions of abstract/concrete and action/reflection (Kolb, 1976). While the individuals tested on the LSI show many different patterns of scores, we have identified four statistically prevalent types of learning styles. We have called these four styles the Converger, the Diverger, the Assimilator, and the Accommodator. The following is a summary of the characteristics of these types based both on our research and clinical observation of these patterns of LSI scores.

The Converger's dominant learning abilities are Abstract Conceptualization (AC) and Active Experimentation (AE). His greatest strength lies in the practical application of ideas. We have called this learning style the "Converger" because a person with this style seems to do best in those situations like conventional intelligence tests where there is a single correct answer or solution to a question or problem (Torrealba, 1972). His knowledge is organized in such a way that, through hypothetical-deductive reasoning, he can focus it on specific problems. Liam Hudson's (1966) research in this style of learning (using different measures than the LSI) shows that convergers are relatively unemotional, preferring to deal with things rather than people. They tend to have narrow interests, and choose to specialize in the physical sciences. Our research shows that this learning style is characteristic of many engineers (Kolb, 1976).

The Diverger has the opposite learning strengths of the Converger. He is best at Concrete Experience (CE) and Reflective Observation (RO). His greatest strength lies in his imaginative ability. He excels in the ability to view concrete situations from many perspectives and to organize many relationships into a meaningful "gestalt." We have labeled this style "Diverger" because a person of this type performs better in situations that call for generation of ideas such as a "brainstorming" idea session. Divergers are interested in people and tend to be imaginative and emotional. They have broad cultural interests and tend to specialize in the arts. Our research shows that this style is characteristic of persons with humanities and liberal arts backgrounds. Counselors, organization development consultants, and personnel managers often have this learning style.

The Assimilators's dominant learning abilities are Abstract Conceptualization (AC) and Reflective Observation (RO). His greatest strength lies in his ability to create theorietical models. He excels in inductive reasoning; in assimilating disparate observations into an integrated explanation (Grochow, 1973). He, like the converger, is less interested in people and more concerned for abstract concepts, but he is less concerned with the practical use of theories. For him it is more important that the theory be logically sound and precise. As a result, this learning style is more characteristics of the basic sciences and mathematics rather than the applied sciences. In organizations this learning style is found most often in the research and planning departments (Kolb, 1976; Strasmore, 1973).

The Accommodator has the opposite strengths of the Assimilator. He is best at Concrete Experience (CE) and Active Experimentation (AE). His greatest strength lies in doing things; in carrying out plans and experiments and involving himself in new experiences. He tends to be more of a risk-taker than people with the other three learning styles. We have labeled this style "Accommodator" because he tends to excel in those situations where he must adapt himself to specific immediate circumstances. In situations where the theory or plans do not fit the facts he will most likely discard the plan or theory. (His opposite type, the Assimilator, would be more likely to disregard or reexamine the facts.) He tends to solve problems in an intuitive trial and error manner (Grochow, 1973) relying heavily on other people for information rather than his own anlaytic ability (Stabell, 1973). The Accommodator is at ease with people but is sometimes seen as impatient and "pushy." His educational background is often in technical or practical field such as business. In organizations people with this learning style are found in "action-oriented" jobs, often in marketing or sales.

The Experiential Learning Theory of Career Development

While much is known in increasing detail about the processes and stages of development in children and adolescents, there has been comparatively little research on the developmental regularities in the lives of adult men and women. This scarcity of empirically based scientific models of development is paralleled by the primitive nature of popular common sense image of adult life (e.g., "They were married and lived happily ever after"), and the notion of a "success ladder" to be climbed rung after rung.

One major reason for the failure to formulate more articulate models of adult development has to do with the difficulty of conceptualizing adult development. While the worlds of children and even adolescents are structurely similar, the worlds of adults become highly differentiated along a great number of dimensions. To deal with this problem of complexity, researchers have developed generalized self-environment process models of career development (e.g., Super and coworkers, 1963) or deterministic models of personality development that trace different career paths to formative experiences in those well-known early years of development (e.g., Roe, 1956; McClelland, 1962) or linear, models of adult development that describe a normative path for human growth that is precipitated through periodic crises of environmental adaptation (e.g., Erikson, 1959) or the familiar trait-factor apporach to career development that focuses on some one or more personal variables as the determinants of career choice which is seen as only one decision, such as the first job choice (e.g., Holland, 1973). While it is not our task here to examine and criticize these different approaches in detail, suffice it to say our approach is to integrate what we feel to be the strengths of each of the above-mentioned theoretical strategies. More specifically, we are attempting in the formulation of the experiential learning theory of adult development to create an approach that: (1) gives a central role to self-environment interaction; (b) describes differentiated paths of adult development; (c) maintains an emphasis on a normative model of human fulfillment; and (d) focuses on certain specific genotypic adaptive competencies that can be used to understand and influence the career development process.

In addition to providing a framework for conceptualizing individual differences in style of adaptation to the world, the experiential learning model suggests more normative directions for human growth and development. As we have seen in the previous section, individual learning styles affect how people learn not only in the limited educational sense, but also in the broader aspects of adaptation to life, such as decision-making, problem-solving and life style in general. Experiential learning is not a molecular educational concept, but rather is a molar concept describing the central process of human adaptation to the social and physical environment. It, like Jungian theory (Jung, 1923), is an holistic concept that seeks to describe the emergence of basic life orientations as a function of dialectic tensions between basic modes of relating to the world. As such, it encompasses other more limited adaptive concepts, such as creativity, problem-solving, decision-making and attitude change, that focus heavily on one or another of the basic aspects of adaptation. Thus, creativity research has tended to focus on the divergent (concrete and reflective) factors in adaptation, such as tolerance for ambiguity, metaphorical thinking and flexibility, while research on decision-making has emphasized more convergent (abstract and active) adaptive factors such as the rational evaluation of solution alternatives.

From this broader perspective, learning becomes a central life task, and how one learns become a major determinant of the course of his personal development. The experiential learning model provides a means of mapping these different developmental paths and a normative adaptive ideal--a learning process wherein the individual has highly developed abilities to experence, observe, conceptualize, and experiment.

The human growth process is divided into three broad development stages. The first stage, Acquisition, extends from birth to adolescence and marks the acquisition of basic learning abilities and cognitive structures. The second stage, Specialization, extends through formal education and/or career training and the early experiences of adulthood in work and personal life. In this stage, development primarily follows paths that accentuate a particular learing style. Individuals shaped by social, educational and organizational socialization forces develop increased competence in a specialized mode of adaptation that enables them to master the particular life tasks they encounter in their chosen career (in the broadest sense of that word) path. This stage, in our thinking, terminates at mid-career, although the specific chronology of the transition to stage three will vary widely from person to person and from one career path to another. The third stage, Integration, is marked by the reassertion and expression of the nondominant adaptive modes or learning styles. Means of adapting to the world that have been supressed and lay fallow in favor of the development of the more highly rewarded dominant learning style now find expression in the form of new career interests, changes in life styles and/or innovation and creativity in one's chosen career.

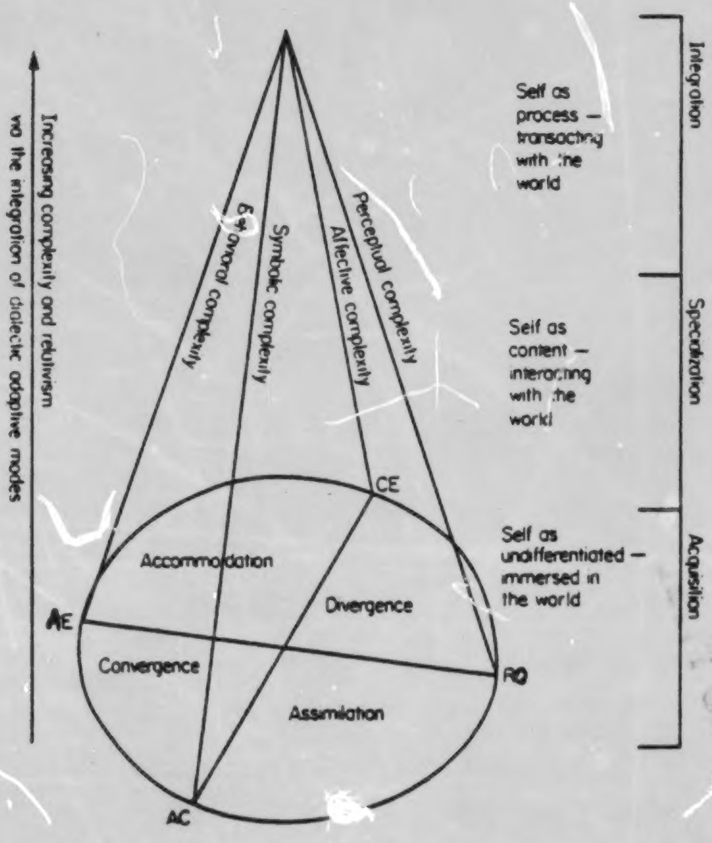
Through these three stages, development is marked by increasing complexity and relativism in dealing with the world and one's experiences, and by higher level integrations of the dialectic conflicts between the four primary genotypic adaptive modes--Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. With each of these four modes, a major dimension of personal growth is associated. Development in the Concrete Experience adaptive mode is characterized by increases in Affective Complexity. Development in the Reflective Observation mode is characterized by increases in Perceptual Complexity. Development in the Abstract Conceptualization and Active Experimentation modes are characterized respectively by increases in Symbolic Complexity and Behavioral Complexity.

In the early stages of development, progress along one of these four dimensions can occur with relative independence from the other. The child and young adult, for example, can develop highly sophisticated symbolic proficiencies and remain naive emotionally. At the highest stages of development, however, the adaptive commitment to learning and creativity produces a strong need for integration of the four adaptive modes. Development in one mode precipitates development in the others. Increases in symbolic complexity, for example, refine and sharpen both perceptual and behavioral possibilities. Thus, complexity and the integration of dialectic conflicts among the adaptive modes are the hallmarks of true creativity and growth.

Figure 2-2 graphically illustrates the experiential learning model of growth and development as it has been outlined thus far. The four dimensions of growth are depicted in the shape of a cone, the base of which represents the lower stages of development and the apex of which represents the peak of development--representing the fact that the four dimensions become more highly integrated at higher stages of development. Any individual learning style would be represented on this cone by four data points on the four vertical dimensions of development. Thus, a converger in developmental stage two (Specialization) would be characterized by high complexity in the symbolic and behavioral modes and lower complexity in the affective and perceptual modes. As he moved into stage three of development, his complexity scores in the affective and perceptual modes would increase.

While we have depicted the stages of the growth process in the form of a simple three layer cone, the actual process of growth in any single individual life history probably proceeds through successive oscillations from one stage to another. Thus, a person may move from stage two to three in several separate subphases of integrative advances followed by consolidation or regression into specialization. (For a more detailed description of this development model, see Kolb and Fry, 1975.)

Figure 2-2: The Experiential Learning Theory of Growth and Development


Increasing complexity and relativism via the integration of dialectic adaptive modes
Behavioral complexity
Symbolic complexity
Affective complexity
Perceptual complexity
CE
Accommodation
Divergence
AE
Convergence
RO
Assimilation
AC
Integration
Self as process — transacting with the world
Specialization
Self as content — interacting with the world
Acquisition
Self as undifferentiated — immersed in the world

III. Description of the Studies and their Methodology

The research project encompases four different studies. The first and most comprehensive is a cross-sectional survey and interview study of social work and engineering alumni from Case Western Reserve University (CWRU) sampled at five year intervals from 1955 through 1975. The second is a study of students in engineering and social work at CWRU and their learning environments. The third study was conducted with a small group of adults of diverse occupations to explore and assess some of the process aspects of learning. The fourth study was an in depth analysis of practicing engineers and their work environments conducted in two different engineering organizations. In addition, several other data sources were used to complement and elaborate the findings of these primary research projects. The details of these supplementary studies will be described as they arise in the course of the presentation of findings. The following pages describe the methodology of the four major studies.

A. The Social Work and Engineering Alumni Study

The selection of professional engineers and social workers as comparative groups in this study derived from the need to have clear differences with respect to learning styles, education environment, and job environment. Research has demonstrated important differences in the structure of knowledge as well as in the learning environments between science based professional education and education of humanities and social sciences (Kolb, 1981). Each of the areas create demand characteristics that the learner must cope with and that shape the learner's learning style. Empiricism is the dominant philosophy and correspondence the main criteria for truth in the science based professions. In social professions the dominant philosophy is pragmatism, truth is defined by workability. Research on experiential learning theory has demonstrated that engineers as a group are convergers and that this learning style is reinforced through the mental press in the occupational setting. Social workers, on the other hand, fall largely into the accommodator quadrant which again is reinforced by their professional education experience and the environmental press of their work setting (Kolb, 1981).

The decision to study graduates from one rather than a number of schools was based on three factors. First, both the Case Institute of Technology and the School of Applied Social Science are outstanding institutions in their respective fields. Second, there was a perceived need to control the variables associated with a learning environment as closely as possible. This is obviously more easily facilitated by reducing the source of variance, in this case the number of institutional settings in which subjects received their professional training. And finally, the third factor was the accessibility of data; this includes student performance records, as well as course selection and other demographic data. In addition, contacting graduates was simplified because of the existence of a well defined and active alumni program.

This research deals with development and change in the professional person and his/her career over time. Ideally, this calls for a longitudinal study--tracking the subjects from their pre-service professional training through the advanced stages of their career, at least beyond the time that many people experience a significant mid-career transition. In fact, true longitudinal studies are very expensive and inordinately time consuming. However, with care in analysis and interpretation, the basic tenents of the theory can be examined empirically through a combination of: (1) a comparative study of people at different stages in their careers, and (2) a retrospective analysis of experiences in previous stages of those who have been professionals for some time. The former requires careful selection of a sample stratified by years in the field. The latter calls for collection of historical as well as current data from the subjects.

Our basic sampling and data collection strategy was to select five graduate alumni classes spaced at five year intervals and to send every member of these classes a survey questionnaire. We then selected a smaller sample from volunteer respondents to the survey for a more intensive individual interview and testing session. These will be referred to as the survey sample and the interview sample respectively.

The Survey Samples. As the most recent cluster or cohort, the class of 1975 was selected. As the earliest cluster of graduates of the School of Applied Social Sciences, the class of 1955 had to be chosen, since the School had no earlier graduates. For similarity's sake, the same year was taken as the earliest cohort for engineering graduates, although their School was founded in 1880. The respective samples are thus constituted by five graduate alumni groups, the classes of 1955, 1960, 1965, 1970 and 1975 in the social work M.S. Program and the engineering B.S. Program.

The classes of 1975 who received their degrees three years previously are apt to be settled into entry-level positions with enough experience to be well adapted to the transition from student to professional roles. The classes of 1970 who are eight years beyond the degree should now be established professionals capable of relatively autonomous work and gearing for advancement. Many (but not all) professionals go through significant career changes by or soon after completing a dozen years in the field.

Some of these changes occur through promotion to managerial positions; others through transfer to new locations or to more demanding jobs. Still others by this time are raising serious doubts about their former ambitions and are seeking new career lines or directions for fulfillment. In any event, the potential for major career transition seems to be highest for the classes of 1965 who have been out of school for about 13 years.

The last two cohort groups (18 and 23 years beyond their basic professional education) are expected to be in the peak of their careers. Providing leadership for the field, they are apt to be in the developmental stage Erikson identifies with generativity vs. stagnation, i.e., at the height of their professional competence and helping the next generation of professionals learn to be effective. The final group in particular is likely to be striving for a balanced integration of the various parts of their lives and for a sense of fulfillment as whole persons.

In each cross-section, all graduates for whom a U.S. address was available from the Alumni Office, were sent a survey questionnaire during the first week of April 1978. Of 1263 graduates of the Case Institute of Technology, 361 responded, at a net response rate of 29%, spread in the same proportion over the five cohort years. Of 392 graduates of the School of Applied Social Sciences, 118 responded, at a net response rate of 30%, spread in the same proportion over the five cohort years. The final survey sample is shown in Table 3-1.

The validity of the responses, as representing the respective samples, was tested statistically by comparing respondents to nonrespondents on information available for both groups from the alumni offices, such as sex, geographic location, type of job title, study major, and donation record. None of the statistical comparisons pointed to a significant bias. However, from respondents' comments it could be inferred that there was some attrition bias through exclusion of alumni engaged in further studies, being unemployed, homemaking, or subject to high time-pressure.

The survey questionnaire took one to two hours to fill out, and contained questions on learning styles, career path, job characteristics, and demographics (see Appendix A). At the end, each respondent was asked to volunteer for a follow-up study, including an interview. About two out of three answered favorably, or were interested, provided more information was given. (204 graduates of Case, or 61% of the effective respondents from that School, volunteered, as well as 71 social work graduates, or 63% of the effective, social work respondents).

The interview samples. Given budgetary constraints on transportation costs, it was decided to limit the sampling for the follow-up study to residents of Ohio. The decision was reinforced after statistical analysis indicated that, on key variables of the questionnaire survey, respondents residing in Ohio did not differ significantly from respondents living outside of the state.

Of 247 volunteers, 91 (or 37%) resided in Ohio. Interview prospects were contacted by telephone to set up a time for the interview. First, the list of unconditional volunteers was exhausted. The initial aim was to have 10 respondents participate from each of the five graduation classes, and for that reason also respondents who had given a conditional, positive answer, were contacted. Finally, the pool of non-volunteers had to be tapped in nine cases, to maximize the number of Ohio-residing interviewees in each cohort year. However, given the low number of social work graduates who live in Ohio, the goal of 10 interviewees per cross-section proved impossible to attain, especially for the early graduation classes.

Given some absences and refusals, 82 persons were finally interviewed and tested by six, carefully trained researchers from December 1978 through March 1979. They included 51 graduates of the Case Institute of Technology, and 31 of the School of Applied Social Sciences (see Table 3-1).

The interviews and testing sessions lasted between two and four hours. The interview was semi-structured and at its conclusion respondents completed a battery of tests designed to assess adaptive competencies. (Details of this procedure are described in Appendix B.)

Given the possibility that the stepwide-sampling procedure could have considerably biased the two interview samples from their respective populations, a double-check was made on a variable which is crucial to the validity of the study. Comparisons were made to make sure that the group of 82 persons finally interviewed was not coming from sub-populations with substantially different learing preferences than the Interview samples.

As indicated by statistical analysis (see Tables 3-2 and 3-3). the learning preferences, as measured by the Learning Style Inventory, of the interviewed social work and engineering alumni do not differ significantly from the others who earlier had responded to the questionnaire but were not interviewed.

The specific instrument and questions given in the surveys and interviews will be described in the sections reporting results.

Table 3-1: The Survey and Interview Samples by Cohort Year

	Case Institute of Technology		School of Applied Social Sciences	
Graduation Year	Survey Sample	Interview Sample	Survey Sample	Interview Sample
1955	61	10	19	4
1960	82	10	15	4
1965	69	11	16	7
1970	94	10	31	10
1975	55	10	37	6
Total	361	51	118	31

Table 3-2: Comparison of Learning Style Inventory Scores for Interviewed and Non-interviewed Engineering Respondents

	n	CONCRETE EXPERIENCE		REFLECTIVE OBSERVATION	
		Mean	SD	Mean	SD
Interviewed	42	13.6	3.3	12.4	2.4
Non-interviewed	292	13.8	3.1	12.9	3.1

ANALYSIS OF VARIANCE	df	Sum of Squares	F	Sum of Squares	F
Between groups	1	1	.1	11	1.3
Within groups	332	3107		3028	

	n	ABSTRACT CONCEPTUALIZATION		ACTIVE EXPERIMENTATION	
		Mean	SD	Mean	SD
Interviewed	42	18.8	3.2	16.6	2.7
Non-interviewed	292	18.6	3.2	16.4	3.3

ANALYSIS OF VARIANCE	df	Sum of Squares	F	Sum of Squares	F
Between groups	1	2	.2	2	.2
Within groups	332	3363		3500	

Notes:
- The standard deviations in each of the four pairs have been tested for homogeneity of variance with the f-test (df = 42/292; alpha = .05).
- All F-ratios reported in the Table are nonsignificant at the .10 level.

Table 3-3: Comparison of Learning Style Inventory
Scores for Interviewed and Non-interviewed
Social Work Respondents

	CONCRETE EXPERIENCE			REFLECTIVE OBSERVATION		
	n	Mean	SD	n	Mean	SD
Interviewed	25	15.5	3.8	26	12.6	2.8
Non-interviewed	85	16.6	3.6	85	13.6	3.3

ANALYSIS OF VARIANCE	df	Sum of Squares	F	df	Sum of Squares	F
Between groups	1	26	2.0	1	21	2.1
Within groups	108	1413		109	1127	

	ABSTRACT CONCEPTUALIZATION			ACTIVE EXPERIMENTATION		
	n	Mean	SD	n	Mean	SD
Interviewed	26	17.2	4.4	26	15.5	3.4
Non-interviewed	85	15.9	3.6	85	16.0	2.8

ANALYSIS OF VARIANCE	df	Sum of Squares	F	df	Sum of Squares	F
Between groups	1	37	2.6	1	6	.7
Within groups	109	1549		109	928	

Notes:
- The standard deviations in each of the four pairs have been tested for homogeniety of variance with the f-test (df = 26/85; alpha = .05).
- All F-ratios reported in the Table are nonsignificant at the .10 level.

B. The Professional Schools Study

Although there is growing evidence that the structure of knowledge and nature of learning environments in science based professional education and education of humanities and social sciences are markedly different (i.e., Kolb, 1981), there is still relatively little understood about how and when these differences impact on the adult learner. The intent of this study was to investigate the construct of "learning environment" in professional schools to better understand:

1) Methodologies for measuring or assessing differences and similarities between learning environments;

2) How learners view and experience professional education in terms of demands or press upon them to develop or use certain competencies;

3) How the shaping of professional mentalities comes about via person-environment interactions in formal, professional school settings.

The sites chosen for study were the Case Institute of Technology and the School of Applied Social Sciences of Case Western Reserve University which produced the alumni sampled in the study described previously. Faculty advisory groups were identified in both schools and consulted throughout the study to advise on strategies and logistics for data collection and recruitment of subjects.

The Student Survey. The first phase of the study involved a survey of graduating students in both schools. The intent of the survey was to ascertain any trends in student's perceptions and self ratings that would indicate predicted differences in preferred learning styles and adaptive competencies between the two schools and collective perceptions of what educational experiences might have led to those preferences. The survey that was developed was similar in overall length and format with the survey from the Alumni Study (see Appendix C for sample student survey).

The selection of graduating students was based upon our assumption that their responses would give us the best reading of any impact of the schools' environments on their professional orientation, learning styles, and competency development that they would now carry forward into their careers. In essence, this sample became another alumni cohert group (class of 1979) which represents a critical transition point in professional careers, from formal learning to on-the-job learning.

Of approximately 115 graduating master's degree students in SASS, 90 received questionnaires and 21 usable surveys were returned (23.3%).

Of 140 graduating seniors in engineering sciences, 120 received questionnaires and 39 (32.5%) usable surveys were returned. While the low response was problematic, the sample responding was not considered to be biased in areas that could impact on our research questions. The learning style scores as measured by Kolb's Learning Style Inventory compared favorably with those of the Alumni Study, lending confidence to the fact that we were not getting responses from an unusual type of learner in either school (see Figure 3-1). It was suggested in one school that we were probably receiving a response from those who mostly "liked" their overall experience, but this would only bias those few questions that asked the respondent to evaluate the school or some aspect of the curriculum. A mail follow-up to non-respondents was attempted but met with little success as neither school had accurate means of tracking graduates to new addresses as they took jobs and moved from campus or local residence.

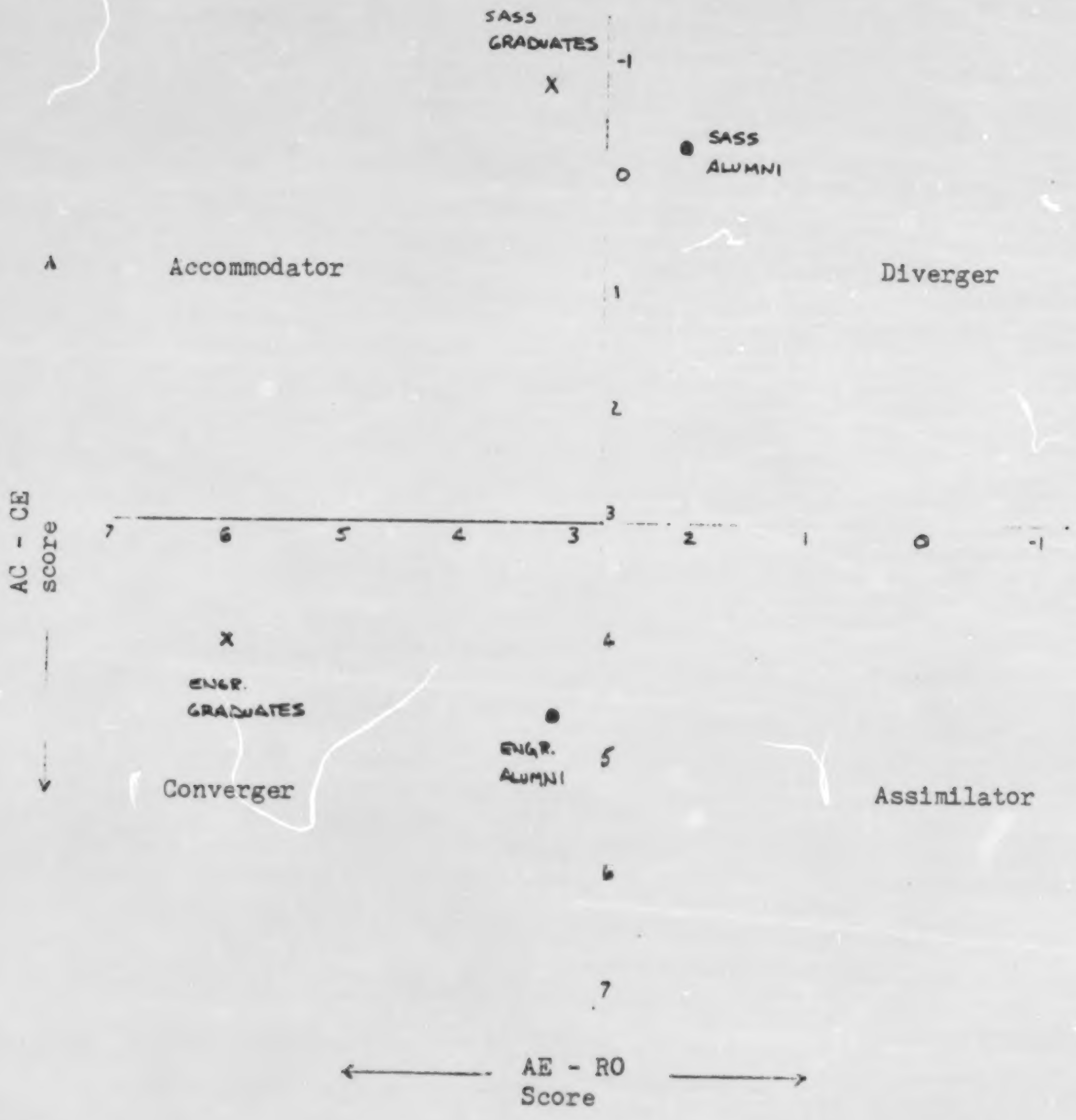
Significant results of the survey analyses are included in Section V of this report.

Assessment of Course Environment. The second phase of this study involved a more detailed, in-depth analysis of how learners experienced professional learning environments in the two schools. Two fundamentally different assumptions regarding the definition of boundary of a learning environment were used concurrently to arrive at the methodology.

First, to advance our understanding of how to measure the press of learning environments upon the learner, we viewed the tradition course as one type of environment the learner encounters or "passes through." As Dubin and Taveggia (1968) have described the classroom, we so defined a course as a 'black box.' Our intent was to expand Fry's (1978) Learning Environment Diagnostic to measure the demands or environmental press of courses upon learners, regardless of learner personality or interaction patterns with other learners. The significant learning environment was thus viewed as independently observerable phenomena within the boundaries of a traditional course. There was evidence from the Student Survey that courses were seen as significant learning environments, amongst others, by the student. Five courses were identified and rated by observers using a modified version of Fry's instrument. Three SASS methods courses were selected, two in the Direct Service track and one in the Administrative track. These required courses were suggested by the SASS Advisory Group as the ones requiring the most of the first-year student's time and the one's most likely to be shaping their professional competencies and attitudes. In the engineering school, two courses were chosen, based primarily on faculty willingness to allow observers into the classroom. One course was a required methods course for juniors in Electircal Engineering and the other was a required systems analysis course for seniors in Mechanical Engineering.

Figure 3-1

Learning Style Type Grid With Group Mean Scores For Engineer And SASS Alumni And Graduating Student Samples



All five courses were observed by a panel of trained observers over one academic term. All five instructors were also interviewed and surveyed at the beginning of the term (see Appendix D for interview protocol). At the end of the term, students in each course were asked to fill out a battery of questionnaire instruments to aid in our analysis of the observer measurements. The content of these instruments and results of these analyses are described in Section V.

The Student Panel Study. Data from The Student Survey also indicated that respondents defined things other than formal courses to be significant learning environments. This perspective, as opposed to the 'black box' concept, is also well represented in literature on environments (i.e., Bronfenbrenner, 1977). The underlying assumption in this case is that the significant environment for the learner is only that which s/he personally perceives to be relevant and is thus unique to each individual. To further our understanding of this context in professional education, we solicited a volunteer panel of SASS and Engineering students to become individual case studies. The purpose of the case study was to understand how the learner viewed his or her learning environment(s); what were they, how important were they, how was each experienced over a period of time, etc. As an exploratory effort, we sought to understand the concept of "learning environment" from the learner's perspective.

Volunteer panelists were sought from the students enrolled in the five courses being observed in the previous study so that some of the panelists' perceptions could be correlated with those of their peers (see Table 3-4). Seventeen students volunteered as panelists and completed the study with us. Eight were from CIT and nine were from SASS.

Data collection for the panel of students consisted of three structured interviews with paper and pencil instruments administered in each interview. Interviews occurred right after the beginning of the term, around the mid-term holiday and shortly after finals week at the end of the term. (See Appendix E for interview protocol and instrumentation.) The following data was collected:

a) 1st Interview: Learning Style scores
Self-perceived Adaptive Competencies
Adaptive Style scores
General questions re. Why in this field
Why at this school
How it has been to date
% time spent in professional education
List of significant Learning Envionments
List of personal goals for next 6 months
Rank order of goals

Table 3-4: Distribution of Panel Members

Site	No. Panel Members Represented	Total No. in Class to be Surveyed
Social Work Methods--A	2	20
Social Work Methods--B	2	20
Social Work Methods--C	5	19
Engineering Systems Course	3	20
Engineering Methods Course	7	47

a) 1st Interview: Rank order of learning environments
(continued) Expectations of learning environments
Bibliographic data

b) 2nd Interview: Revisions/additions to list of Learning Environments
Revision to list of goals
Revisions to ranking of either of the above
Self-perceived demands of top five environments
Semantic differential scales for top five environments
% energy devoted to each of top five environments
Self-perceived Adaptive Competencies
Changes in expectations from first interview

c) 3rd Interview: Ranking of environmental press for each of top five environments
Expected grade or rank in courses
Perceived affect of environments
Learning Environment Diagnostic scores for those environments also being observed in other study
Goal achievement ratings
List of new/emerging goals
Self-perceived Adaptive Competencies
Self-perceived change/growth in Adaptive Competencies
Learning Style Inventory scores

Findings related to the analyses of these cases are reported in Section V-C.

C. The Experiential Learning Process Study

This pilot study was undertaken to explore the process of experiential learning in greater detail. In defining and attempting to measure the adaptive competencies associated with experiential learning we found that individuals showed considerable variation in their learning processes - a variation that was to some extent masked by tests such as the Learning Style Inventory. To explore this variation more fully and to better understand the process of experiential learning a projective test was created to allow the full expression of a person's learning process. The test called the LAMP (Learning Assessment of Micro-Processes) is an unstructured picture sorting task. It was administered to a sample of 20 adult men and women of various occupations.

The responses to the test were coded and analyzed to portray each individuals molecular approach to learning. Results of the study are reported in Section IV.

D. The Engineering Work Environment Study

This study was undertaken to explore person-environment interactions in an actual work setting. Our intent was to advance our working hypotheses and methods for understanding person-environment interactions in formal professional education (The Professional Schools Study) to the work place where the person is viewed as learner and the job/organization climate as the learning environment. Specifically, this study sought to:

1. Develop instrumentation to assess work environments in terms commensurate with experiential learning theory; and
2. Assess the impact of matches and mis-matches between learner style and job demands on satisfaction and career orientation.

Two local engineering firms were selected as research sites. A total of 91 engineers and engineering managers were surveyed to collect ratings of their work environment, work abilities, learning style, professional mentality, job satisfaction, and personal career goals.

The two sites were selected to maximize differences on dimensions of size, technological orientation, structure, and type of engineering/specialization employed. Our goal was to conduct an in-depth analysis of a sample that represented a range of engineering or technically oriented jobs and careers patterns. Companies A and B provided important contrasts in the areas cited above.

Company A consisted of several divisions organized as autonomous profit centers. The particular division studied provided a standarized group of electrical drive components to manufacturers of industrial and transportation equipment. While the electrical products industry has experienced rapid technological change since the introduction of transistors, microprocessing computers, and the like, this division's activities would not be classified as representative of a high technology organization.

The central task of the engineer in this setting was to provide appropriate electrical drive configurations to match customer requests. He did this primarily by selecting "best fit" components from an inventory of standardized items. Given the nature of the work, the engineering specialty represented in Company A is electrical engineering. There were only two exceptions among the subjects. One subject was a mechnical engineer and another had changed from an engineering major to business major in his last year, although at the time of this study he was engaged primarily in engineering project work.

Approximately eight months prior to this study, this division underwent significant reorganization designed to promote increases in productivity, efficiency, and job satisfaction. The organization had been restructured from large serial departments of engineering specialists to smaller parallel units focused on industries or products. These smaller units were conceived of as independent project teams adequately staffed in terms of both skills and number to respond to large system and products which require customer and consultant-engineering coordination. In this environment, several engineers and draftsmen working as a unit are exposed to both challenge and the stress associated with meeting customer deadlines within the constraints of intraorganizational quality and cost parameters.

Company B produced products combining advanced chemical technology and innovative mechanical design in several market segments that service transportation industries. In its 50 year history the company has developed a reputation for high quality and innovative application of state-of-the-art developments in chemical adhesive, vibration dampening, and noise control systems.

Given the range of products and applications, the number and kind of engineering and technical specialities represented by the subjects was greater than in Company A. The dominant specializations represented were: mechanical engineering, chemical engineering, industrial engineering, and scientists with advanced degrees in chemistry and physics.

The organizational structure in Company B was somewhat more traditional than in Company A in the sense of being more functionally and hierarchically organized. There was, however, in Company B, the primary orientation toward different products and markets among the engineering subgroups. A summary of differences is presented in Table 3-5.

The distribution of subjects by job role in each site is shown in Table 3-6.

Data was collected via questionnaires and structured interviews with each subject. Description of instruments used, analyses, and findings are reported in Sections V-D and V-F.

Table 3-5

Summary of Differences of Company A and Company B

	Company A	Company B
Technology	Application of standardized technology	Development and application of advanced chemical and mechanical technology
Structure	Small product-oriented autonomous project groups	Traditional hierarchical oriented groups assigned to particular indusiries
Engineering Specialites	Predominantly electrical engineers (two exceptions)	Mechnical, chemical, industrial engineers, and chemists and physicists
No. of Subjects	43 (all male)	42 (all male)

Table 3-6

Distribution of Organizational Roles
by Company

	Company A	Company B
Senior Managers (n = 13)	4 Division Managers 4 Sernior Managers	1 General Manager 3 Group Managers 1 Technical Advisor
Managers (n = 15)	9 Team Managers	6 Team Managers
Senior Engineers (n = 29)	3 Senior Project Engineers 3 Principal Engineers 2 Senior Engineers	6 Senior Engineering Specialists 15 Engineering Specialists
Engineers (n = 28)	5 Systems Engineers 7 Control Engineers 3 Project Engineers 1 Customer Engineer 1 Design Engineer 1 Programmer Engineer	7 Senior Product Engineers 3 Product Engineers
N = 85*	N = 43	N = 42

* 85 of 91 respondants provided useable questionnaire data.

IV. Assessing the Adaptive Competencies of Experiential Learning

A. Introduction

The concept of competence represents a new approach to the improvement of performance by matching persons with jobs. The previous approach, that of measurement and selection of personnel by generalized aptitudes, has provided a dismal failure in spite of heroic efforts to make it succeed (see Tyler, 1978, Chapter 6 for a review). The basic problem of the aptitude testing approach was that aptitudes were too generalized and thus did not relate to the specific tasks in a given job producing low correlations between the aptitude measure and performance. In addition, the aptitude and task measures often were not commensurate, i.e., they did not measure the person and the task demand in the same terms.

The competency assessment approach focuses on the person's repertoire of skills as they relate to the specific demands of a job. Tyler summarizes two of the major advantages of this approach:

> The attempts to characterize individuals in terms of their competencies showing up in occupational, educational, developmental, and personality psychology are of great potential importance. For one thing, they cut across boundaries. Instead of assessing intelligence and achievement in school children, skills in job applicants, and symptoms in psychiatric patients, we can examine what each person in any of these categories can and cannot do. One can capitalize on the developed competencies and set up situations in which competencies not now present can be acquired, whether these are basic educational competencies, occupational competencies, or interpersonal or intrapersonal competencies. The competency approach thus provides individuals and their helpers with clear guidelines as to what to do next.
>
> Another potential benefit is the generation of the concept of complementarity to supplement the concept of competitiveness so prevalent in modern society. Mental testing as it has been practiced for more than half a century is both an expression and a stimulator of this competitiveness. One's worth is measured by how superior or inferior to other people one is. One's psychological health is judged by the location of one's score in a distribution representative of the population. Competencies represent a completely different way of structuring our perceptions of others. The more competencies other people have, the better for each of us, and it is essential for the functioning of complex society that individuals develop different repertoires of competencies. The absolute limits of each person's living time make all-around competence for one individual impossible. We need one another (Tyler, 1978, pp. 104-105).

A major aim of the research project is to identify and measure generic competencies that lead to effective adaptation to the challenges of adult development. To meet this goal we have had to reexamine the assumptions underlying traditional psychological testing approaches and devise a new theoretical formulation of adaptive competence and an assessment methodology that is congruent with the assumptions underlying that formulation. In the theory of experiential learning, adaptation is a process of choice making, which results in the resolution of tension between assimilating experience into one's cognitive structure and accommodating to the environment. Inasmuch as environments vary from minute to minute in time and from situation to situation in space, it can be assumed that the most effectively adaptive person is the one who can call on any and/or all adaptive skills to effect a continuing "fit" to the ever changing environment.

We have defined adaptive competence as the synergetic congruence between adaptive orientation and environmental press (where adaptation is the balanced transaction between assimilation and accommodation). There are three levels of adaptation to the environment ranging from discrete to generic to developmental. The levels of this adaptation continuum are defined by the extension of the adaptive orientation in time, space, and consciousness. The three general divisions or levels of the continuum correspond to three levels of adaptative competence: performance competencies, learning competencies, and developmental competencies. Figure 4-1 shows these three levels of competence as they relate to extension in time, space, and consciousness. Performance competencies represent adaptation in short periods of time to specific situations in a goal directed way. Learning competencies are more generic and thus more extensive in time and space. They can be thought of as learning heuristics that facilitate learning how to learn generic clusters of performance competencies. Developmental competencies are adaptive orientation whose extension is for lifetimes or even generations. These represent the integrative adaptive processes whereby we develop integrity and a guiding life purpose.

Experiential learning theory provides an holistic framework for describing adaptive competencies in a way that personal skills and environmental demands are conceived in the same terms. Since adaptation and learning are characteristic of all person/situation transactions, a taxonomy of competencies derived from experiential learning theory makes comparison possible across widely different settings, occupations and tasks. In this taxonomy the four modes of experiential learning are conceived of as generic learning competencies that encompass classes of performance competencies. Developmental competence arises from the integration of these generic adaptive competencies. Figure 4-2 describes the four generic learning competencies as they are reflected in performance learning and development. In other words, adaptive competence is the result of a learning process and, as such, its development from the most simple adaptation to the most complex can be traced along the same line as the development of learning. Experiential learning theory views the development of learning as involving three stages: acquisition (from birth to adolescence) which marks the basic acquisition of learning abilities and cognitive structures; specialization (from adolescence to mid-life) which marks the accentuation of a particular learning style

FIGURE 4-1

DEVELOPMENTAL LEVELS OF ADAPTIVE COMPETENCE

EXTENSION	TIME	seconds minutes hours days	weeks months years decades	lifetimes
	LIFE SPACE	responses acts tasks projects	jobs occupations careers	lifes generations
	CONSCIOUSNESS	Goal - directed first order feedback to achieve goals	Learning how to learn 2nd order feedback to change goals & strategies	Consciousness/Integrity 3rd order feedback to link goals to life purpose
LEVELS OF COMPETENCE		PERFORMANCE	LEARNING	DEVELOPMENT
Personal Assimilative Structure		Many discrete specialized structures with low integration within and between them	Fewer but larger specialized structures. High integration within structures; low integration between structures	Development of complementary specialized structures. High integration between structures
Environmental accommodative structure		Discrete situations bounded in time and space. Tangible explicit stimuli	Generic homogeneous clusters of situations. Tangible and inferred stimuli	Interpenetration of situational clusters unbounded in time and space. Ambiguous self constructed stimuli

FIGURE 4-2

ADAPTIVE COMPETENCE AND EXPERIENTIAL LEARNING THEORY

	ELT Developmental stage	ACQUISITION (Performance competencies)		SPECIALIZATION (Learning competencies)		INTEGRATION (Developmental competencies)	
ELT MODAL DEVELOPMENT	Concrete Experience (Affective complexity)	Direct sensing and feeling	Continuity of sensation and feeling	Self aware Feeling and sensing value system	Differentiating Self and others Feeling and sensing values	Relativistic appreciation of value systems	Value commitment within relativism
	Reflective Observation (Perceptual complexity)	Attention	Watching continuous images	Reflection: giving observations personal meaning	Creating alt. meaning and observation schemes	Relativistic appreciation of different meaning schemes & points of view	Intuition: choosing meaningful perspectives
	Abstract Conceptualization (Symbolic complexity)	Recognizing: enactive thought	Object constancy "iconic" thought,	Concrete symbolic operations	Formal hypothetico-deductive reasoning	Attaching concrete meanings to symbol systems	Finding and solving meaningful problems
	Active Experimentation (Behavioral complexity)	Responding to circumstance	Doing: short range Intentional acts toward goals	Achieving: development of clear goals and longer range strategies	Risktaking: making goal & strategy trade-offs	Experimental: hypothesis testing: change goals & strategies based on results	Responsible Action: accepting unknown emergent reality

over others, and integration (from mid-life to death) which marks the reassertion and integration of nondominant learning styles and adaptive modes (see Section II, Figure 2-2). As an individual grows and develops along the four generic modes of the learning model, greater complexity in structures and behavior are demonstrated at each level of development from acquisition through specialization to integration. Development in concrete experience is characterized by increasing affective complexity; development in reflective observation is characterized by increasing perceptual complexity; development in abstract conceptualization is characterized by increasing symbolic complexity; and development in active experimentation is characterized by increasing behavioral complexity.

Overview of Section IV. The remainder of this section describes our attempts to operationalize the above thinking. Part B describes a study of the process of experiential learning that illuminates the moment to moment fluctuations of the adaptive process and gives some indication of how higher order generic adaptive orientations develop. Part C describes research designed to identify the clusters of performance competencies that are related to the four generic adaptive competencies postulated by experiential learning theory. Part D reports the validation studies of a new self-report measure of generic adaptive competencies, the Adaptive Style Inventory. Part E reports the results of our attempts to develop behavioral measures of the generic adaptive competencies. Part F reports research on the development of a measure of developmental competence called adaptive flexibility.

B. Experiential Learning Theory: Explicating the Process

Glen L. Gish

Many forms of knowledge have been created, or discovered, through the ages. Each person goes through some process to obtain access to one or more of these forms of knowledge. This process is called learning. Learning can be viewed in many ways. In this paper learning is viewed as an adaptation process which focuses on the interaction of the adaptive, or learning, style of a person and the press of the environment. The emphasis here will be on the learning style of the individual. Concern for the environmental press will be primarily in terms of methodological issues.

Learning, as adaptation, is a process by which persons recognize elements of their environment as forms of knowledge and choose to exploit that environment through adaptation processes. A person may view a picture and recognize an aesthetic press and respond with an emotional feeling. Another person may view the same picture and recognize a symbolic representation of an idea and respond by categorizing that idea within a conceptual framework. In this paper this phenomenon will be explored in order to explicate the process by which learning occurs.

Experiential Learning Theory

Experiential learning theory is based on a structural analysis of the learning process that identifies two basic underlying dialectic dimensions: concrete experience and abstract conceptualization, and active experimentation and reflective observation (Kolb, 1979-80). These two dimensions identify four learning modes in a cycle that suggests a sequence of learning--concrete experience (CE), to reflective observation (RO), to abstract conceptualization (AC), to active experimentation (AE) and on to CE as the cycle continues. Each learning mode represents a separate learning focus. That is, people must be able to involve themselves fully, openly, and without bias in new experiences from many perspectives (CE); they must be able to observe and reflect on these experiences from many perspectives (RO); they must be able to create concepts that integrate their observations into logically sound theories (AC); and they must be able to use these theories to make decisions and solve problems (AE). The concrete and abstract modes form the poles of one dimension, while the active and reflective modes form the poles of the other dimensions. In this idealized learning process, persons are forced to choose among opposing orientations and as a result develop styles of learning that represent characteristic ways of resolving conflicts among these orientations. Previous research has indicated that they tend to develop a preference for two modes, one from each dimension, that form a learning style (Kolb, 1978).

The LSI focuses attention on the extent to which a person prefers each of the four learning modes. It also provides a label that indicates to each person who takes the LSI which pair of learning modes that person prefers most; each pair being classified as a learning style. This approach, unfortunately, is used to type persons and draw attention away from the process aspects of experiential learning theory. This paper attempts to renew the process focus of experiential learning theory. This theory has been expressed mostly in structural terms with the process implied. The only explicit process notion in the theory has been the cycle sequence of moving from one learning mode to another.

A Process Perspective

It has been our interest to elaborate the structural aspects of experiential learning theory by explicating more clearly its processes. Through this elaboration we hope to create a firm link--a bridge--between the structure of knowledge and the ways in which that knowledge is obtained. That is, we want to demonstrate how the various forms of knowledge hold within them a structure and process by which they can be obtained, or learned, by people. We take our lead from Piaget who describes structure in this manner:

> As a first approximation we may say that a structure is a system of transformations. Inasmuch as it is a system and not a mere collection of elements and their properties, these transformations involve laws: the structure is preserved or enriched by the interplay of its transformation laws, which never yield results external to the system nor employ elements that are external to it. In short, the notion of structure is comprised of three key ideas: the idea of wholeness, the idea of transformation and the idea of self-regulation (1968, p. 5).

This definition strongly suggests that a structure of knowledge has within it three process elements. We are focusing on the process of transformation, and less so on the processes of wholeness and self-regulation.

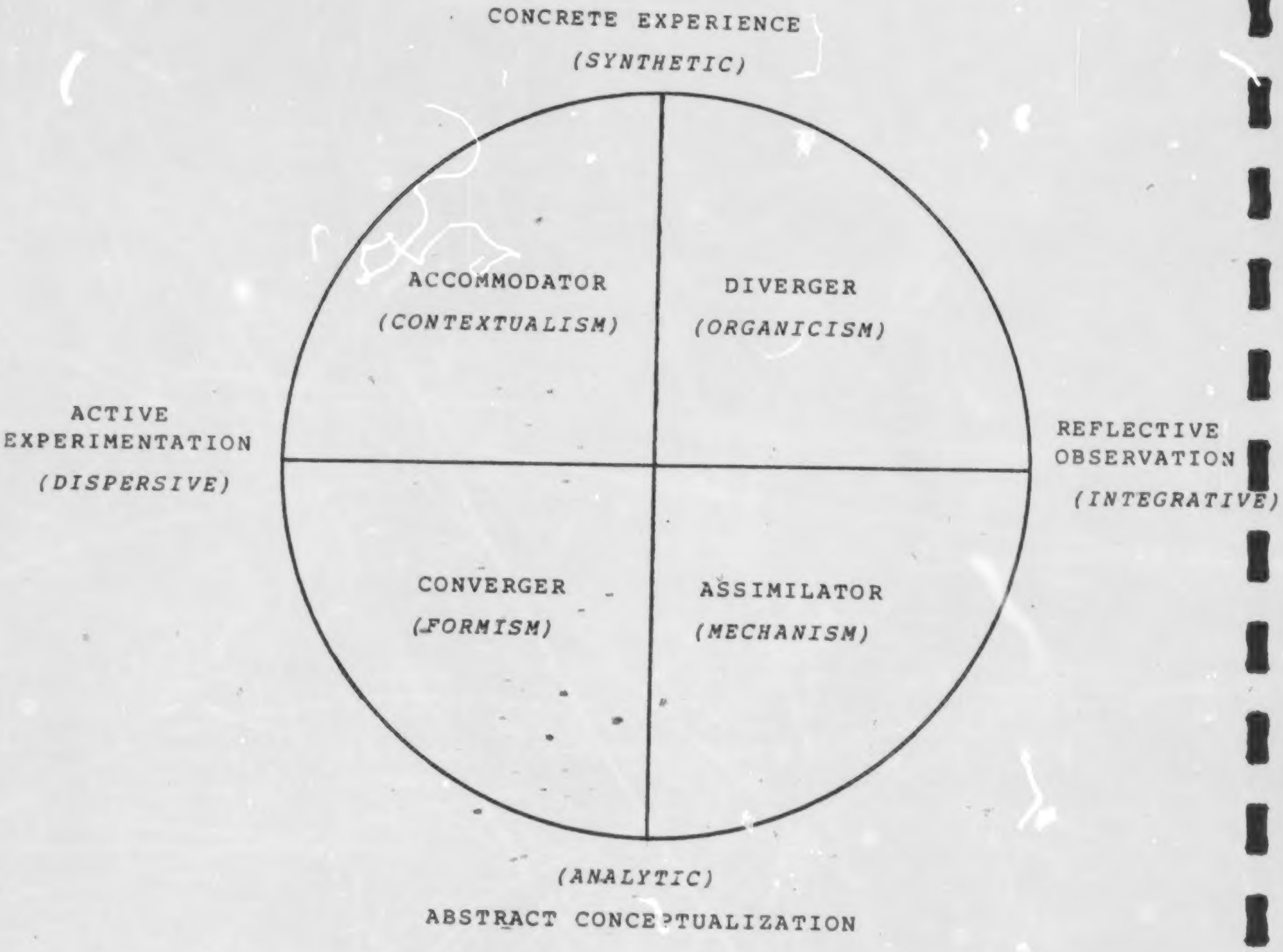
A further contributor to our process perspective is Stephen Pepper and his concept of world hypotheses (1970). The LSI styles somewhat parallel the four world hypotheses suggested by Pepper as indicated by Figure 4-3. In addition, Pepper presents four types of theories: analytical, synthetic, dispersive and integrative. These correspond to the four learning modes of abstract conceptualization, concrete experience, active experimentation, and reflective observation.

Pepper describes formism as deriving from the root metaphor of similarity which takes two forms, describing the world in terms of similarities and creating things in terms of a plan. Truth is based on correspondence. Mechanism is derived from the root metaphor of the machine. Truth for a mechanist rests in mental contents. Contextualism is based on the root metaphor of the historical event as a current phenomenon. Truth is special, deriving from action and actual events; pragmatic. Finally organicism is based on the root metaphor of the biologically organic. Truth is based on coherence; the categorial features of the organic whole.

The parallel between experiential learning theory and world hypotheses is highlighted in Pepper's statement that:

FIGURE 4-3

EXPERIENTIAL LEARNING THEORY AND WORLD HYPOTHESES


CONCRETE EXPERIENCE
(SYNTHETIC)
ACCOMMODATOR
(CONTEXTUALISM)
DIVERGER
(ORGANICISM)
ACTIVE EXPERIMENTATION
(DISPERSIVE)
REFLECTIVE OBSERVATION
(INTEGRATIVE)
CONVERGER
(FORMISM)
ASSIMILATOR
(MECHANISM)
(ANALYTIC)
ABSTRACT CONCEPTUALIZATION

> . . . analysis is treated dispersively by formism and integratively by mechanism, and synthesis is treated dispersively by contextualism and integratively by organicism (p. 142).

This statement suggests strongly the transforming power of the dispersive (active experimentation) and integrative (reflective observation) modes. This brings us to a position where we can define knowing in process terms. Knowing (K) can be viewed as an interaction of the dimensions of prehension (P) and transformation (T):

$$K = P + T$$

Prehension introduces the notion of grasping knowledge either through direct experience or through conceptualizing. Transformation introduces the major process mechanisms through which the grasping at knowledge is catalyzed, either through action or reflection.

Knowing as we are using it here is the same as learning in that both are means of obtaining knowledge. As suggested at the beginning of the article, learning is an adaptation process involving the interaction of the person and the environment; i.e., the interaction of the structure and process of knowledge in the environment and the structure and process a person brings to bear as he receives or acts upon that environment.

For instance, the inadequate performance of an employee comes to my attention as his supervisor through a rumor. I can grasp the meaning of this report by repeating the rumor to myself and reflecting on it; that is, transforming the rumor into some internally significant meaning. Alternatively, I might ask other supervisors if they have heard the same rumors to check out the strength of the rumor; that is, transform the rumor into a stronger or weaker stimulus. Thus, I have the option to take emotion-laden data and transform it through reflection or transform it through action.

But suppose I learn of the inadequate performance through a formal, well documented paper report. I can grasp the meaning of the report by reading it carefully and thinking about the impact of the report on myself and the business organization; that is, transforming the documentation into a coherent set of information through reflection and organizing of the data. Or, I could take some time to observe the performance of the employee and talk with the employee about how he does his work; that is, transform the documentation into a directly experienced set of facts through an intervention in the work of the employee. In this case I have the option to take conceptualized data and transform it through reflection and organization or transform it through an intervention action.

The structural model now comes alive with the interaction of these two dimensions of prehension and transformation. Their interaction creates the process qualities of the model. Kolb has pointed out the creative tension between the polar concepts on each of these dimensions. What is being added here is the creative interaction between the two dimensions of prehension and transformation suggested by Pepper. It is suggested that learning occurs for an individual only when a form of prehension links with a form of transformation. For example, to comprehend something a person must either transform it by internalizing it or testing it out in the environment. The same could be said for apprehending something. It is not possible for a person only to prehend something. To make that prehension useful or meaningful for a person, he must transform it in some way. In this way the prehension is not only made a part of the individual but enables him to turn that prehension into a resource for deeper, more complex knowledge.

Redefined Learning Modes

In order to build a process model from Kolb's model, the learning modes have been redefined into process terms. These modes form the basic elements of the dimensions of knowing. Concrete experience is redefined as apprehension to indicate the process of obtaining immediate experience (Polanyi's "tacit knowledge," 1958; and Pepper's "spacious present," 1966) of concrete phenomena. It is a form of prehension that is global (Witkin's "field dependence," 1977), immediate and focused on the senses. It is also personal (Berger and Luckman's phenomenology, 1967), emergent and deals with feelings, both tactile and emotional (Calder's "right brain functions," 1970). Abstract conceptualization is redefined as comprehension to indicate the creation of concepts by which experience is ordered. It is another form of prehension; prehension that is analytic, explicit (Pepper's "actualities," 1966) and oriented to the past experience of the person. It also includes the operational functions of talking, reading, and writing as well as the higher mathematical functions (Calder's "left brain functions," 1970). Reflective observation is redefined as intension to indicate the movement of experience and concepts inward toward the person to generate meaning (Jung's "introversion," 1923). It is a form of transformation of forms of prehension that brings the external environment into the person, reflecting and comparing its various elements in a passive manner (Friere's "reflection," 1970; and Wolfe's "bringing of the internal environment to inward processes," 1979). Observing and considering the validity of one's solution hypotheses (Kagan and Kagan, 1970) are also parts of intension, as are imaginings and timeless contemplations (Gurvitch's "time of long duration and slow motion," 1955). Active experimentation is redefined as extension to indicate the movement of experience and concepts outward toward the environment to test their implications in the external context. It is seen as moving the person into the environment in the sense that the person defines himself in terms of the environment (Jung's "extraversion," 1923). Extension, then, is active, involving an experimenting process (Friere's "action," 1970). It carries experience and thought forward (Gendlin, 1968) attempting to create a passage or a relationship between experience and/or concepts.

With these process definitions of the modes developed, we are ready to turn to a further consideration of the dimensions of which these elements are an integral part.

Typology of Dimensional Interactions

It will be recalled that prehension signifies ways of grasping knowledge, and transformation signifies ways of catalyzing knowledge. There are four different ways the learning dimensions of prehension and transformation can interact. In describing these interactions, Figure 4-2 can be used as a reference. The dimensions can interact in a manner in which one learning mode from one dimension interacts with one mode from the other dimension, e.g., CI, CE, AE, AI. These correspond to the four learning styles described by Kolb (see Table 4-1).

The dimensions can interact with double transformations of one of the prehension modes, i.e., to intend and extend a form of prehension at the same time. The resultant interactions are EAI and ECI.

Our supervisor example can demonstrate these double transformations. EAI (extension and intension of apprehension) would represent my asking for confirmation of the rumor from other supervisors and reflecting on the effect of each confirmation or nonconfirmation on my feelings about the rumor. ECI (extension and intension of a comprehension) would represent, on the other hand, going over the report with the employee to determine its validity and adding the response of the employee to my evaluation of the efficacy of the report, in addition to my independent reading of the report.

The dimension can interact with a single transformation of both forms of prehension, i.e., to apprehend and comprehend through a single form of transfformation. The resultant interactions are CIA and CEA. CIA (intension of both comprehension and apprehension) would involve my reflection on both the rumors and the formal report of the inadequate performance. Thus, the quality of my understanding of the nature of the employee's performance rests on my reflections or use of intension transformation of both prehensions. Conversely, with CEA (extension of both apprehension and comprehension), I talk with other supervisors and the employee about the rumors and the formal report, or I observe the employee and ask other supervisors to do the same to confirm or disconfirm the content of the rumors and the formal report. The result is a different quality of meaning that I derive about the nature of the rumors and the reports than I did by reflecting by myself.

And finally, the dimension can interact fully when a person engages all four learning modes at once; what could be called a "peak experience" or an "integration." The supervisor who reflects on the personal impact of the rumors and the formal report while engaging with the employee and other supervisors in conversations and direct, interpersonal contact is one who optimizes his learning by doubly transforming both forms of prehension.

Learning and Development

Experiential learning theory is concerned not only with a structure of learning modes and styles but a learning process that leads to the cognitive development of a person. The problem has been to discover the process(es) by

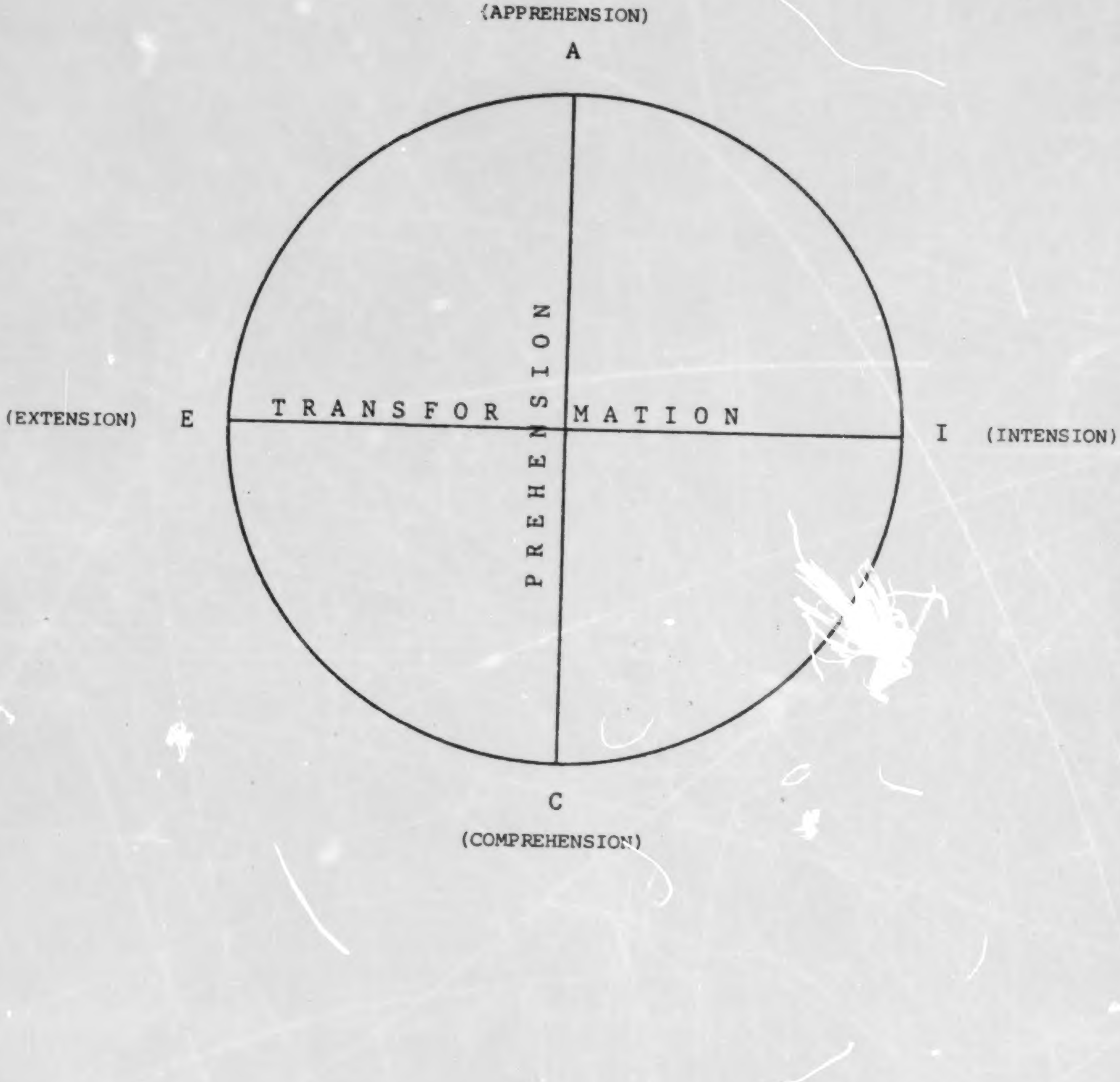
TABLE 4-1

COMPARABILITY OF MODELS (KOLB, PEPPER, GISH)

LEARNING STYLES (KOLB)	WORLD HYPOTHESES (PEPPER)	PERFORMANCE LEARNING (GISH)
ASSIMILATOR (ASS)	MECHANISM	COMPREHENSION AND INTENSION (CI)
CONVERGER (CON)	FORMISM	COMPREHENSION AND EXTENSION (CE)
DIVERGER (DIV)	ORGANICISM	APPREHENSION AND INTENSION (AI)
ACCOMMODATOR (ACC)	CONTEXTUALISM	APPREHENSION AND EXTENSION (AE)

FIGURE 4-4

EXPERIENTIAL LEARNING PROCESS MODEL


(APPREHENSION)
A
PREHENSION
TRANSFORMATION
(EXTENSION) E
I (INTENSION)
C
(COMPREHENSION)

which a person can move from the acquisition level through the level of specialization to the level of integration. By focusing on the transformation process, a key to this developmental model is suggested. The acquisition level can be viewed as a process whereby a person develops performances that are combinations of one transformation mode and one prehension mode. To move into specialization, a person uses sets of three learning modes. The result is heuristic learning which is defined as either transforming one form of prehension with both forms of transformation, or, transforming both forms of prehension with one or the other form of transformation. The integration level can be achieved through developmental learning which involves the use of both transformation modes to transform both prehension modes. This latter kind of learning, we suspect, occurs only over time for the most part, and is seldom experienced in a single moment. These three kinds of learning will be demonstrated later in this paper as phenomena observable in learning micro-processes.

Research Methodology

The method of this study is in many ways like the learning processes we are attempting to describe. Numerous iterations of theory development, instrument design and data collection and analysis were carried out to arrive at a significant integration of theory and experience, of comprehension and apprehension. A flexible mechanism was sought to open to a respondent a wide range of possible behaviors that might indicate the use of various learning modes in different combinations. Paper and pencil instruments have a decided press toward extension and comprehension. An instrument which provided opportunities for respondents to enact apprehension and extension, in addition to intension and comprehension, was desired. As a result, a projective device of sorting pictures into an arrangement of the respondent's choosing was developed. Thirty-two magazine pictures, rephotographed to equalize size and quality, were created through numerous interations of expert Q-sort (persons knowledgeable in the theory chose among 285 pictures ones which best captured the desired concepts) to obtain a wide range of content within each picture and among the entire set of pictures. Respondents were asked to arrange the pictures on a surface in any manner they liked. A researcher recorded behavior during the sorting. Each behavior was then coded as a particular elaborated performance or skill-building behavior. The sequence of behaviors was mapped to obtain patterns of learning behaviors. These patterns provide interesting insights into learning processes.

To demonstrate briefly how persons responded to the picture sorting task and how their behaviors were recorded, a woman will be portrayed during the opening period of her sorting:

Sue begins by looking at her watch.	Observer records the act which is later coded AI due to the immediate time press felt by Sue and the internalization of that concern.
She begins to look at the pictures singly, with little hesitation on each.	Observer notes, later coding it as AI to reflect her experiencing of each picture globally or on an emotional level while not attempting to arrange the pictures, rather taking in first impressions.

After a few minutes, Sue spreads the pictures out on the table.	The act is coded AE to denote an active manipulation to enhance the overall global impression of the pictures.
She arranges the pictures into a rough circle.	This behavior is coded CIA to capture the beginnings of some conceptualization or ordering of the pictures while retaining some aesthetic flow. Intension is the dominant transformation mode due to the geometric form which signals an internal shaping of an idea and feeling about the pictures.
Sue, then, picks up five pictures, purposefully.	All three of the next behaviors are coded CE. They represent acting on concepts which Sue has formed to guide her sorting.
She forms them into a group on the table, apart from the other pictures.	
She forms another group which gets combined with the first group.	
A period of detached observation of the existing arrangement ensues.	Coded CI to note the reflection on the ideas expressed in the arrangement.
Sue slowly slides a few pictures around, tentatively.	Also coded CI because the dominant response is reflecting on the concepts that are taking form in the arrangement.
The arranging continues . . .	

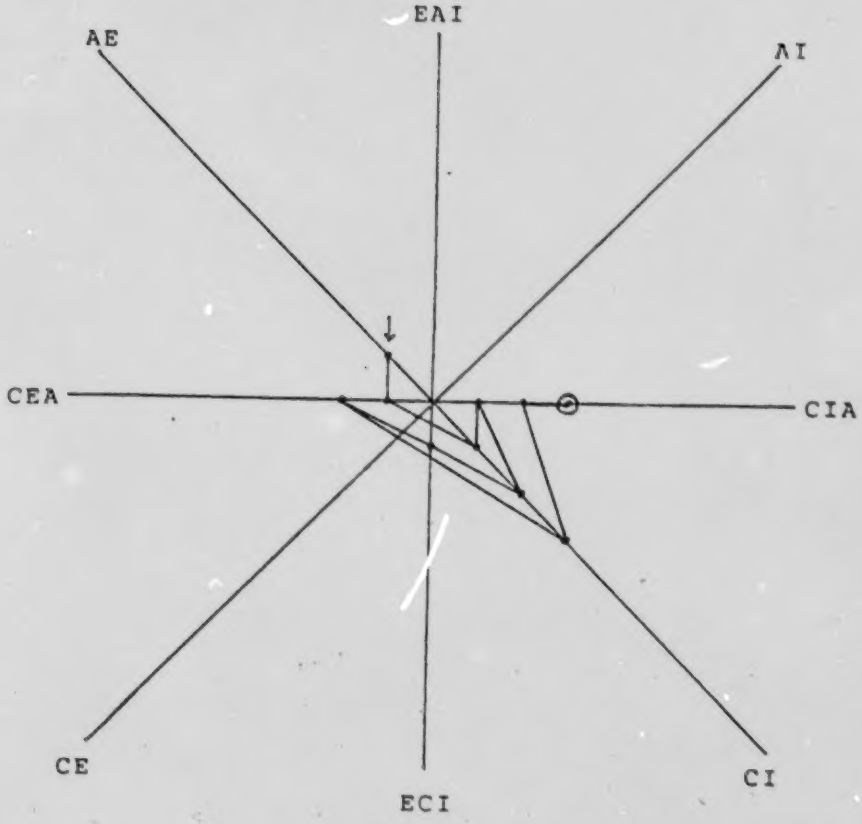
Learning Behavior Mapping

The sequence of learning behaviors as coded, were mapped on a four quadrant map as shown in Figure 4-5. This map follows the performance of Sue, our respondent.

The process begins at the point on the AI scale indicated by an arrow. It proceeds as indicated by a line to a second point on the AI scale, one unit further on the AI scale to indicate the extent of Sue's use of this heuristic. If Sue had returned to this heuristic the next point would be placed three units out on the AI scale. The process is mapped further by the continuous line linking points on the scale of the AE, CE, and CI performances and the CIA heuristic learning process. The ending point is circled. In this example, the heuristic learning processes of ECI, CEA, and EAI are not utilized by the hypothetical respondent.

FIGURE 4-5

Graphic Description of
Sue's Learning Process


EAI
AE
AI
CEA
CIA
CE
ECI
CI

The instrument designed to capture this process is called the Learning Assessment of Micro-Processes (LAMP) to indicate its focus on understanding the process by which people learn. A picked sample of 20 persons, half male and half female, representing a wide range of professions, ranging in age from 20 to 45 was selected. This sample was purposefully chosen from a group of professionals who are members of a common church group to which the author also belongs. They had demonstrated a capacity to stay engaged in a task--a requirement for respondents who are administered the LAMP. Also, each was relatively highly developed professionally and in their interpersonal interaction abilities. Each participant was chosen because they were promising as representatives of a wide range of learning styles. Each respondent completed the LSI instrument. Each of the learning styles--assimilator, diverger, accommodator, and converger--were represented by five respondents. This fortuitous circumstance afforded the opportunity to compare the results from the two instruments. This will be discussed later in this paper. These persons characteristics were observed by the author during the three year period of their acquaintances. Their performances on the LSI confirmed the author's expectations about most of them.

Patterns of Learning Sequences

Kolb suggests a number of possible patterns of learning such as the experiential learning cycle and the four learning styles. The cycle is the most process oriented while the learning styles represent types of approaches to learning. This inquiry extends his work by postulating, from a data base, a way of characterizing the learning process of individuals at the micro-process level. The result has been two kinds of data: (a) a listing of frequencies of performance learning (PL) and heuristic learning (HL) behaviors which demonstrate a wide variety of use of the eight types of behaviors (Table 4-2); (b) a correlational analysis between the results on the LSI and the LAMP; and (c) a mapping of learning micro-process patterns.

It should be noted that two trained observer raters were used to test the reliability of the LAMP instrument. The inter-rater reliability on encoding observed behaviors was 87 per cent with 2.2 per cent of the behavior items contrastingly encoded and 10.8 per cent encoded with partial agreement (e.g., AE and AI). This indicates a good beginning has been achieved in developing a behavior coding system which can be shared with other researchers and which can be cross-validated between two or more trained raters in any subsequent administration of the LAMP instrument.*

Table 4-2 reveals the high variability people can bring to a given task. For example, every respondent enacted every performance learning type at least once in the course of their sorting of the pictures, while 16 respondents enacted at least two heuristic learning behaviors.

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*Note: The actual scoring system is available from the author upon written request.

TABLE 4-2

LAMP DATA

SUBJECT NUMBER	LSI STYLE	PERFORMANCE AI	AE	LEARNINGS CI	CE	HEURISTIC LEARNINGS CIA	CEA	CEA-CIA	EAI	ECI	LSI DIMENSION AC-CE	AE-RO
1	ACC	1	7	12	1	2	3	1	0	1	-13	6
2	ACC	7	7	9	2	4	2	-2	1	0	-3	11
3	ACC	4	9	7	2	0	0	0	0	0	-4	5
4	ACC	5	7	1	2	1	5	4	0	0	-9	4
5	ACC	6	11	10	6	1	6	5	0	1	-14	5
6	DIV	16	7	2	4	4	1	-3	0	1	0	0
7	DIV	7	8	5	9	6	1	-5	0	1	-8	-1
8	DIV	2	3	7	5	3	1	-2	0	3	-1	-4
9	DIV	3	6	3	4	3	1	-2	0	0	-8	-2
10	DIV	6	7	6	8	2	2	0	0	0	-2	-4
11	ASM	5	6	6	3	3	0	-3	0	0	5	-2
12	ASM	2	4	3	1	0	2	2	0	0	14	-5
13	ASM	7	9	4	4	5	2	-3	0	2	7	2
14	ASM	4	8	10	5	0	5	5	0	1	5	-2
15	ASM	5	8	7	3	3	2	-1	1	0	5	-3
16	CON	2	2	5	1	6	3	-3	0	1	10	9
17	CON	2	7	12	6	0	4	4	0	0	5	7
18	CON	3	8	5	3	3	4	1	0	2	16	4
19	CON	9	6	0	4	4	2	-2	0	0	9	12
20	CON	3	6	14	3	3	7	4	1	0	7	3

No clear pattern emerges in relating kinds of behavior recorded with the LAMP and the self-report learning style preferences obtained on the LSI instrument. It was expected that comprehension and apprehension would be negatively correlated, and the intension and extension would also be negatively correlated. Since the internal logic of the transformation dimension is viewed as very different from that of the prehension dimension, partial correlations were performed on these dimensions to eliminate any confounding that would occur if both dimensions were considered simultaneously. The result was a strong negative correlation between apprehension and comprehension (-.81, significant at the .001 level) and between intension and extension (-.74, significant at the .001 level). A parallel partial correlatonal analysis of the same variables on the LSI instrument yielded similar results (concrete experience and abstract conceptualization; -.76, significant at the .001 level, and active experimentation and reflective observation; -.51, significant at the .05 level). Only one relationship between the LSI and the LAMP was revealed in a direct correlational analysis: Reflective observation on the LSI was related to extension on the LAMP (.49, significant at the .05 level). This is contrary to expectations and defies explanation until further data collection and analysis can be performed.

Employing non-parametric tests, it was noted that two forms of heuristic learning, CIA and CEA, relate to the active-reflective dimension of the LSI:

	Number of CIA	
	>2.7	<2.7
Active Experimentation	5	5
Reflective Observation	3	7

	Number of CEA	
	>2.7	<2.7
Active Experimentation	3	7
Reflective Observation	9	1

$p < .01$ (Fishers Exact)

Further, this suggests that heuristic learning only relates to the transformation dimension. That is, since the CIA heuristic relates positively to the reflective observation learning mode but is undifferentiated in relationship to the active experimentation learning mode, and since the CEA heuristic relates positively to the active experimentation learning mode and negatively to the reflective observation learning mode, it appears that when comparing the LSI and the LAMP instruments the active-reflective, or transformation dimension, contributes to the appearance of these two heuristics. However, the heuristics of EAI and ECI were so little used in this sample, no relationship could be tested for either heuristic with the transformation or the prehension dimension.

These results indicate that both the LSI and the LAMP are effectively measuring the molar concepts as contrasting on their respective dimensions. The comparison of the two instruments yields the limited but interesting results of a suggested relationship between the heuristics of CIA and CEA of the LAMP and the active-reflective dimension of the LSI. The positive relationship between reflective observation on the LSI and extension on the LAMP suggests that the two instruments are measuring the molar concepts in different ways. This suggestion is confirmed by the absence of relationship between parallel concepts on the two instruments. The data do suggest the possibility, however, that the LSI is measuring the heuristic learning orientations displayed by respondents on the LAMP. The small relationships between reflective and the intensive learning heuristic CIA and active experimentation and the learning heuristic CEA suggests that further study might find similar relationships between these and the other two modes, Concrete Experience with EAI and Abstract Conceptualization with ECI. It appears that self-reported preferences of respondents on the LSI must be interpreted differently than the observed behaviors on the LAMP. Although the LSI and the LAMP obtain strong contrasting relationships of the modes on each dimension, it is not at all clear that what persons report as their learning preferences will be revealed in their behavior. It appears that people act out their learning process differently than they report. Alternatively, the encoding process of the picture sorting behaviors on the LAMP could be interpreting behaviors differently than the word choice encoding of the LSI. This would be somewhat expected since the LAMP encoding process is based on a modified theoretical statement of experiential learning theory. When focusing on a continuous learning process based on observed behavior, it is not unexpected that the results would not be confirmed by the results of an instrument measuring a learning type.

The mapping of the learning micro-processes proved most fruitful, in contrast among respondents. Even with this small sample, a rich set of patterns of learning emerged. The analysis of these patterns yielded a rich array of learning sequences. A few samples have been selected for portrayal here to suggest the value of this form of analysis.

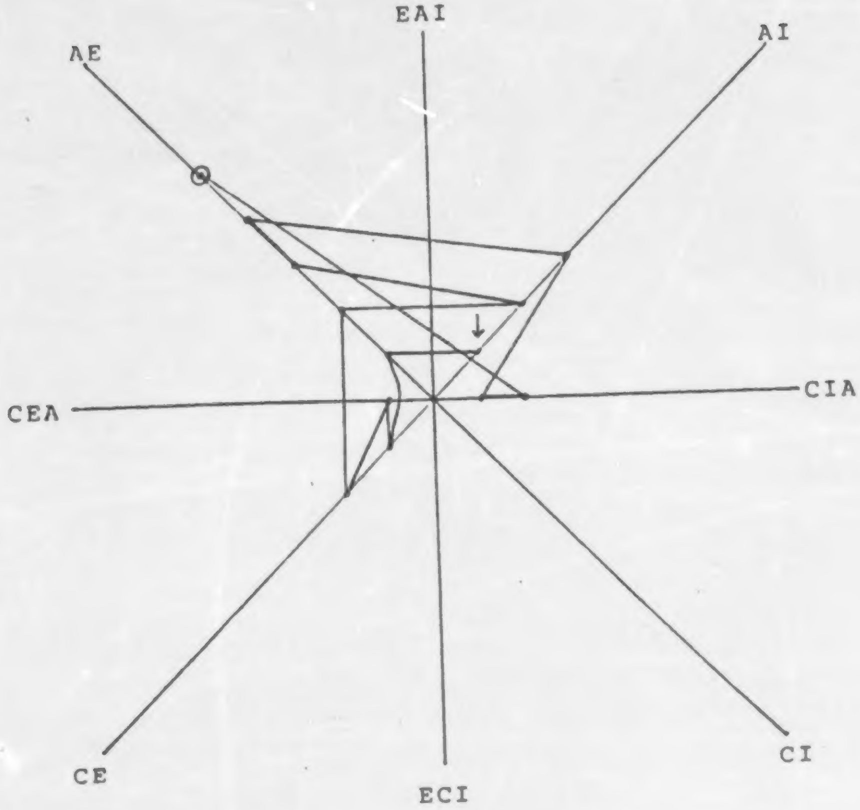
Lamp Sample Patterns

While the LSI portrays a dominant, preferred learning style of a respondent, the LAMP portrays how a respondent actually used performance, heuristic and developmental learning over time, given a complex task. Four cases are presented here to portray the richness of analysis which can be available with this form of mapping.

Case I: Figure 4-6 represents the performance of a woman, a pharmacist, who is a converger according to the LSI. Her map indicates that she uses heuristic learnings that center around apprehension. It is clear that she alternates her transformation modes between extension and intension. This is further indicated by the fact that her use of heuristic learning is limited to the horizontal dimension--CEA and CIA. However, early in her sorting activity she engaged the comprehension mode three times in succession indicating a possible opening strategy of converger, or CE performance learning, as her LSI score would suggest. Her only

FIGURE 4-6

Graphic Representation of the Learning Process for Case 1


EAI
AE
AI
CEA
CIA
CE
ECI
CI

return to the comprehension mode was a late pair of CIA heuristic learning processes which could indicate an increased complexity of behavior toward the end of a task which focuses on intention transformation.

This map accurately portrays the respondent as she has been experienced by the author. This woman is very expressive and enjoys new people and experiences, consistent with her tendency to use most the apprehension mode of learning. Her extensive experience of entering new situations, including several international environments, has probably encouraged her to engage her converger approach to cope initially with new and strange situations, but once entered she engages her dominant apprehension mode. Finally, when she is called upon to complete a task she does become serious and thoughtful, trying to maximize her feelings and concepts to derive a sound conclusion, as seen in the two CIA behaviors. She then expresses her conclusion with a certain flair and energy as clearly indicated in her AE finish in the sorting activity.

Case 2: Figure 4-7 reports the performance of another woman, an educator, who is an accommodator according to her LSI score. She clearly alternates between AE and CI performance learning with the dominant performance being AE which confirms her accommodator learning style. What this LAMP map captures that the LSI does not is the use of the opposite performance, CI, in regular contrast to AE. In addition, she uses the CEA heuristic interspersed between these alterations, appearing to increase the complexity of her behavior as she progresses through the alternating pattern toward a conclusion that is focused on the comprehension mode. Thus, this woman begins with an active (extension) direct experience (apprehension) approach, but with increasing engagement of the comprehension and intension modes creates a complex comprehension conclusion.

This respondent has been experienced by the author as an active, sometimes boisterous and highly verbal woman. This is consistent with her entry process to this sorting task, especially when her tendency to engage in metaphoric repartee early in an encounter is noted. This repartee easily can be seen as a CI kind of performance. However, engaged in a task or interaction over time, this woman becomes increasingly serious and focused, as is shown in her LAMP map.

Case 3: Figure 4-8 maps the sorting activity of a woman, an ordained Protestant minister, who is a diverger according to her LSI score. She follows a cyclical pattern opposite to the direction suggested by the experiential learning theory. This case clearly shows how a self reported learning preference--in this case, diverger--can be other than the dominant performance used in an actual situation. However, this diverger could be seen as acting out her creative and divergent preferences by cycling through the other performance and heuristic learning processes to enhance the variety and richness of the experience. In addition, this respondent began the sorting activity in a more active (extension) mode but shifted to increasing intension mode behaviors as she approached her conclusion.

This serious-minded, sensitive and caring woman has been experienced by the author as very proactive in optimizing her experience and skills in a variety of

FIGURE 4-7

Graphic Representation of the Learning Process for Case 2

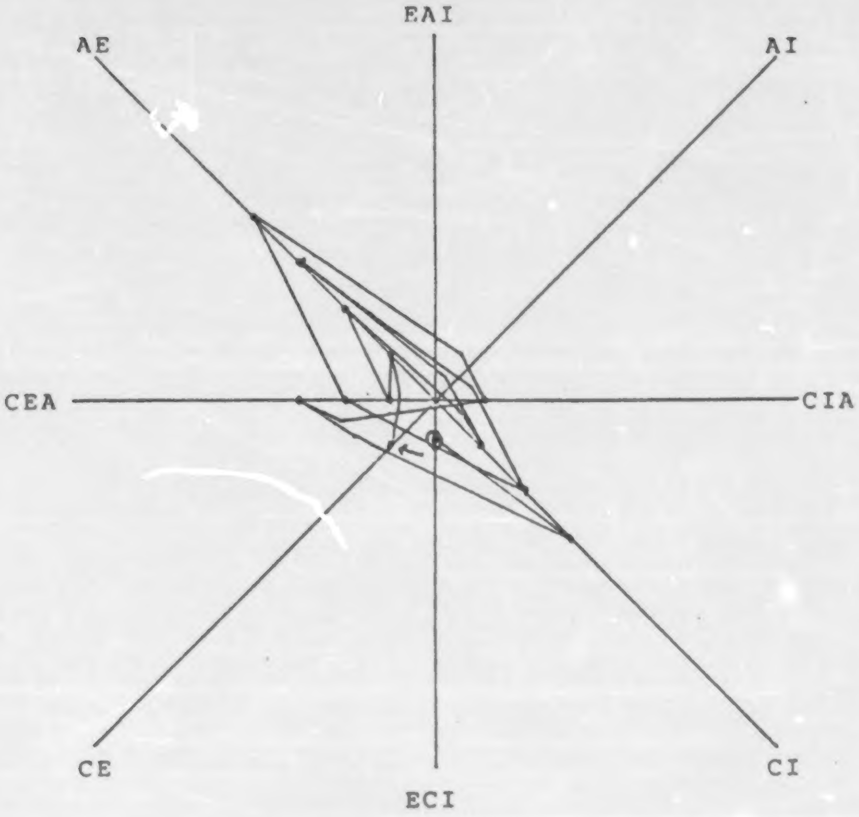
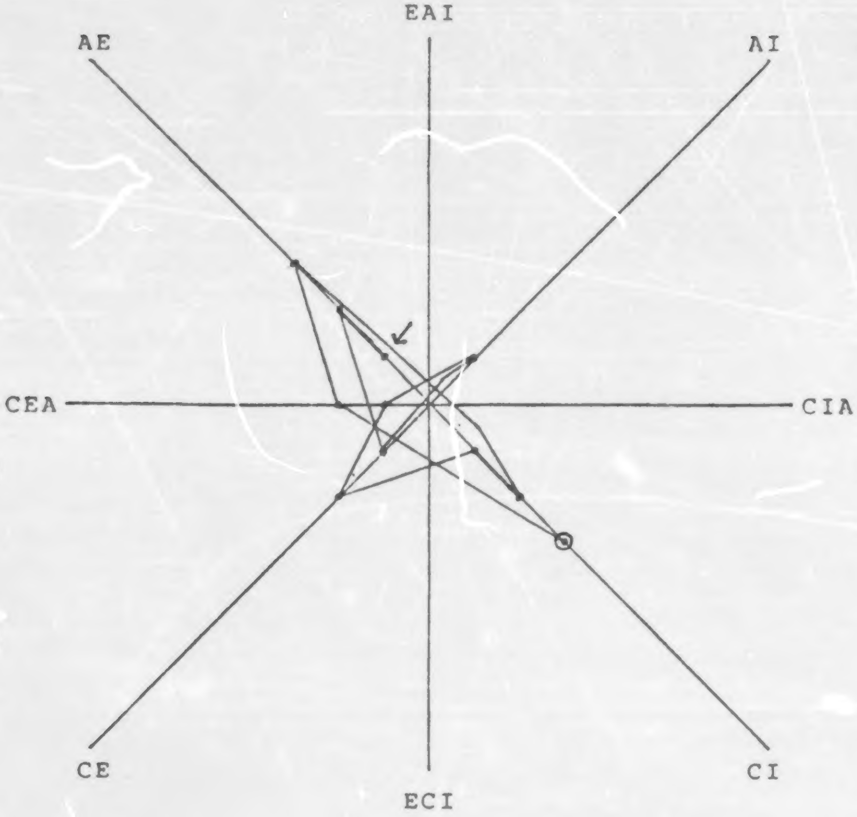


FIGURE 4-8

Graphic Representation of the Learning Process for Case 3


EAI
AE
AI
CEA
CIA
CE
ECI
CI

areas. Her ministry takes her into a wide variety of situations including youth work, counseling, preaching and visiting the sick and elderly. Her life and work style is accurately reflected in her LAMP map with its variety of learning approaches and a desire to deal with a situation from several perspectives. She is characterized well by the closing strategy of the sorting activity where she engages a CI performance twice, as though she is developing a thoughtful conceptualization, and then tests that conclusion through the AE performance before finalizing the CI conclusion. She truly insists on achieving a coherence between the experience and the theology of her faith and profession.

Case 4: Figure 4-9 portrays the picture sorting activity of a man, a patent lawyer, who is an assimilator according to his LSI score. His performance is the most complex in this sample. He begins with a cycle approximating the experiential learning model, engaging each of the four heuristic learning processes, including one heuristic learning process, CIA. He then switches to a pattern that is dominated by the AE performance which is alternated with heuristic learning processes that all have the comprehension mode as an element. In addition, the intension mode of transformation is included in three of the later behaviors including the concluding behavior. Thus, his assimilator style exerts itself as he concludes the sorting activity.

The author has experienced this man as an intense, socially active person who often shares his professional expertise in organizational and interpersonal situations. His entry into situations is often characterized by a careful consideration of all aspects of those situations similar to his opening behaviors in the picture sorting. After initial experience in a situation, he tends to use trial and error methods, periodically calling on more complex inputs based on his professional knowledge and experience. His trial and error approach is further enhanced by a lively sense of humor about the mixed results of his attempts at workable solutions. He projects a desire to be considered as intelligent and thoughtful, which could account, in part, for his preference for the assimilator learning style. Of course, the press of his profession demands the use of many learning approaches but with an emphasis on CI performances.

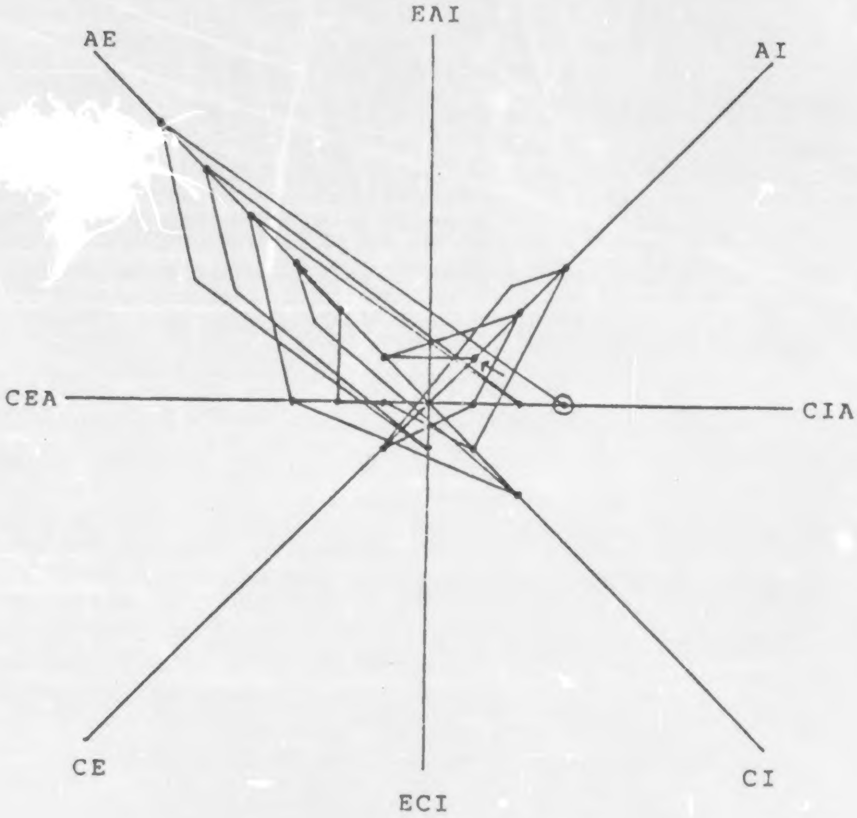
Many additional interpretations could be made of each respondent's learning micro-process. However, these examples and the suggested interpretations are intended to suggest the potential richness of this form of process analysis. More exhaustive interpretation is not really possible at this point in the research due to an insufficient quantity of cases. Moreover, additional interpretation probably requires collaboration with the respondents.

Conclusion

It has been demonstrated that attention should be drawn away from attempts to classify individuals as having certain learning traits. Rather the focus might be more fruitfully placed on learning micro-processes as displayed in the actual behaviors of individuals. Learning traits are convenient labels to place on people, but people have a way of breaking the boundaries of any category to

FIGURE 4-9

Graphic Representation of the Learning Process for Case 4



which we attempt to limit them. This research suggests that people engage in a full range of learning modes and combinations thereof. They vary from person to person, and from situation to situation, only in the sequences in which they enact the modes and their combinations and the quantities of each.

Further we have followed the lead of Piaget by highlighting the process aspects at the structure of experiential learning theory by focusing on the transformation processes of the model. We view the ELT model as an interaction of the transformation dimension with the prehension dimension. We also observed people engaging these interactions over time. This brought out a lively process that shows how people achieve a satisfactory completeness, or wholeness, in a given activity. They do so through a self regulating process that is unique to each, but which can be described fully by the experiential learning theory. This process explication enables us to begin examining more closely how people can progress toward more complex levels of development, to achieve greater power to learn from their experience with their various environments. The next step, it is suggested, is to determine what insights can be drawn from the sequences people enact as they engage in similar and dissimilar learning tasks.

Implications

The implications of this study are three-fold: theoretical, methodological and practical. Theoretically, this study has pointed to the need to create definitions and models which capture the process implications of the learning endeavor. Heavily structural models and definitions are neat and clear, but tend to obscure the aspects of learning that give learning its vitality and creative force, namely the unfolding of learning processes over time and varying contexts. The process focus can provide the means to begin to look at the developmental aspects of the experiential learning theory. It does so by providing the tools for monitoring learning over an extended period of time and to note when a learning process changes in significant ways; ways that would indicate a shift from a lower developmental level of learning to a higher level. This study has made some elementary steps to show various levels of complexity and integration in the learning process of respondents.

Methodologically, this study has pointed toward the value of creating instruments which enable researchers to monitor an unfolding learning process. It has also noted the need for research tools which reduce the narrow test bias of conventional paper and pencil tests. These kinds of tests need to be replaced with tools which allow the respondents to display, as authentically as possible, the full range of their learning processes. However, the instrument developed in this study, the LAMP, is relatively primitive and will require many iterations of further refinement. The LAMP must be administered to a much larger sample and then submitted to rigorous statistical analysis to determine more exactly how behaviors are to be coded. However, even with the current LAMP instrument, we have been able to draw interesting conclusions that can direct subsequent inquiry into the complexities of the learning process.

Finally, the practical implications of this study seem to be two major ones. The most important is that learning must be viewed as an ongoing process, not a structural tool with limitations prescribed by a set of traits believed to accurately portray a person's approach to learning. For formal institutions of learning this implication suggests that interventions in the learning of students must take into account the ongoing processes of their learning and not impose a structure which may confound, interrupt or derail the students' learning development. Care must be taken to monitor current learning processes of a student in order to make appropriate interventions to enrich that process.

For work environments this study suggests that people can increase their capacity to learn new skills and assume greater responsibilities if the environment--superiors, peers, the technology, the social context--can permit, even encourage, persons to monitor their own learning processes and engage a variety of learning mode combinations which will provide them with increasing learning leverage. This would reduce the tendency for people to acquire a limited set of skills which they repeat unvaryingly with static productivity results, which the bureaucratic trait test approach encourages. People who are aware of their learning processes and are encouraged to enhance them would tend to increase their productivity through new approaches to existing tasks. Possibly, such an approach to learning would lead to redefinitions of tasks to more closely contribute to organizational goals and to the quality of life experienced by people in the workplace.

C. Assessing Performance Competencies--The Competency Circle

We have conceived of the learning styles described in experiential learning theory as learning competencies, that is, as higher level learning heuristics that facilitate the development of a generic class of more specific skills that are required for effective performance on different tasks. Each task we face requires a corresponding set of knowledge skills and attitudes for effective performance. The effective matching of task demands and these personal attributes results in a performance competency. Performance competencies thus conceived become a vehicle for assessing personal characteristics and job demands in commensurate terms. Thus the performance competencies required for a specific job can be compared to a person's inventory of performance competencies to determine the degree of fit, areas for needed development, and so on.

Our objective in this research was to develop a taxonomy of these performance competencies that met two criteria, ecological validity and construct validity. By ecological validity we mean that the taxonomy of competencies developed should faithfully and exhaustively describe the important aspects of all the jobs we examine in social work and engineering. Observers or incumbents in these jobs should be able to fully describe their job by selecting competencies in the taxonomy. Construct validity is used in a specific sense here to describe how well the performance competencies relate empirically to the learning competencies described in experiential learning theory. If both of these criteria can be met, the taxonomy of performance competencies becomes an holistic system for assessing persons and jobs. Such a system has several desirable characteristics.

1. It becomes possible to describe very different jobs in similar terms. Among other things this enables giving equal pay for equal work and the identification of transferable skills across job categories.

2. Development and educational needs can be identified along career paths through the identification of those job transitions that require markedly different portfolios of performance competencies.

3. Preparatory and professional education can be addressed to the development of the learning competencies required for the pivotal performance competencies in different professional careers. Thus the focus of professional education becomes learning how to learn required performance competencies rather than acquiring specific skills that may become obsolete before they are used.

4. Areas of deficiency resulting from specialized education and work experience can be identified and addressed in order to prepare individuals for the integrative challenges of higher level jobs and adult developmental tasks.

The research reported here must be seen as a first step toward meeting the criteria of ecological and construct validity. We have achieved some modest success in achieving these goals but have also identified important problems for future research. To study the relationship between learning styles as learning competencies and the specific performance competencies associated with them, we developed a list of performance competencies based on our knowledge of the jobs in social work and engineering and the hypothesized relationship of these performance competencies to learning styles. The resulting list of 24 competencies was submitted to the engineering and social work survey sample as part of the questionnaire. Respondents were asked to rate their level of skill on these competencies (called work abilities on the questionnaire to avoid jargon) on a seven point scale. This question is reproduced on the next page.

To assess construct validity, i.e., the relationship between the performance competencies and the learning competencies of experiential learning theory, the self-rated competencies of professional engineers and social workers were correlated with LSI abstract/concrete (AC-CE) and active/reflective (AE-RO) scales. These correlations were then plotted on the two dimensional learning space created by combining these two scores (see Figure 4-10). For example, the skill of being personally involved correlated -.25 with AC-CE and +.10 with AE-RO placing it in the accommodative quadrant of the learning style space.

The results of this analysis showed four competencies significantly related ($p < .01$) to the learning competency of affective complexity (concrete experience)--being personally involved, dealing with people, being sensitive to people's feelings, and being sensitive to values. Three were related to behavioral complexity--making decisions committing one's self to objectives, and seeking and exploiting opportunities. Seven performance competencies were related to symbolic complexity --experimenting with new ideas, creating new ways of thinking and doing, generating alternative ways of thinking and doing, analyzing quantitative data, designing experiments, testing theories and ideas, and building conceptual models. No competencies were related to perceptual complexity (reflective observation). Some performance competencies that were predicted to relate to the perceptual complexity learning competence such as gathering information did not correlate significantly with any of the four learning competencies, while others such as creating new ways of thinking and doing related significantly to symbolic complexity.

To further refine these generic clusters of performance competencies, the 24 competencies were subjected to factor analysis and cluster analysis. Factors and clusters in this analysis corresponded directly to the three learning competency clusters identified by correlation with the LSI. A fourth factor and cluster encompassed the items gathering and organizing information which we have chosen to treat as the perceptual complexity cluster of performance competencies. Setting goals was also added to the behavioral complexity clusters as a result of this analysis because of its high loading the factors and cluster including the other three behavioral performance competencies (see Miller, 1979 for details).

The result of these analyses is our best estimate of the performance competencies associated with the four learning competencies of experiential learning given the limitations of the data. These clusters of performance competencies were arranged around the generic learning competencies of the learning cycle in what we called a competency circle (see Figure 4-11). This competency circle was used as a tool for further data analysis to be described in Sections V and VI. It has proved a useful means for describing jobs, person-job congruence, the impact of professional education and work experience, and developmental needs in career paths.

9. Work abilities: (circle the appropriate number for each item)

At the present time, how would you rate your kind of ability in the following skill areas (whether you use them in your present work or not)?

	I am: Unskilled		Average			Highly skilled	
a. Identifying problems to work on	1	2	3	4	5	6	7
b. Planning for your office.	1	2	3	4	5	6	7
c. Building conceptual models.	1	2	3	4	5	6	7
d. Committing yourself to objectives	1	2	3	4	5	6	7
e. Creating new ways of thinking and doing .	1	2	3	4	5	6	7
f. Making decisions.	1	2	3	4	5	6	7
g. Designing experiments	1	2	3	4	5	6	7
h. Being sensitive to values	1	2	3	4	5	6	7
i. Establishing criteria for work quality. .	1	2	3	4	5	6	7
j. Generating alternative ways of doing things.	1	2	3	4	5	6	7
k. Organizing information.	1	2	3	4	5	6	7
l. Setting goals	1	2	3	4	5	6	7
m. Experimenting with new ideas and approaches.	1	2	3	4	5	6	7
n. Identifying opportunities to pursue . . .	1	2	3	4	5	6	7
o. Defining and clarifying problems.	1	2	3	4	5	6	7
p. Dealing with people	1	2	3	4	5	6	7
q. Gathering information	1	2	3	4	5	6	7
r. Seeking and exploiting opportunities. . .	1	2	3	4	5	6	7
s. Evaluating programs and people.	1	2	3	4	5	6	7
t. Analyzing quantitative data	1	2	3	4	5	6	7
u. Being sensitive to people's feelings. . .	1	2	3	4	5	6	7
v. Being personally involved	1	2	3	4	5	6	7
w. Testing theories and ideas.	1	2	3	4	5	6	7
x. Measuring the performance of people and programs.	1	2	3	4	5	6	7

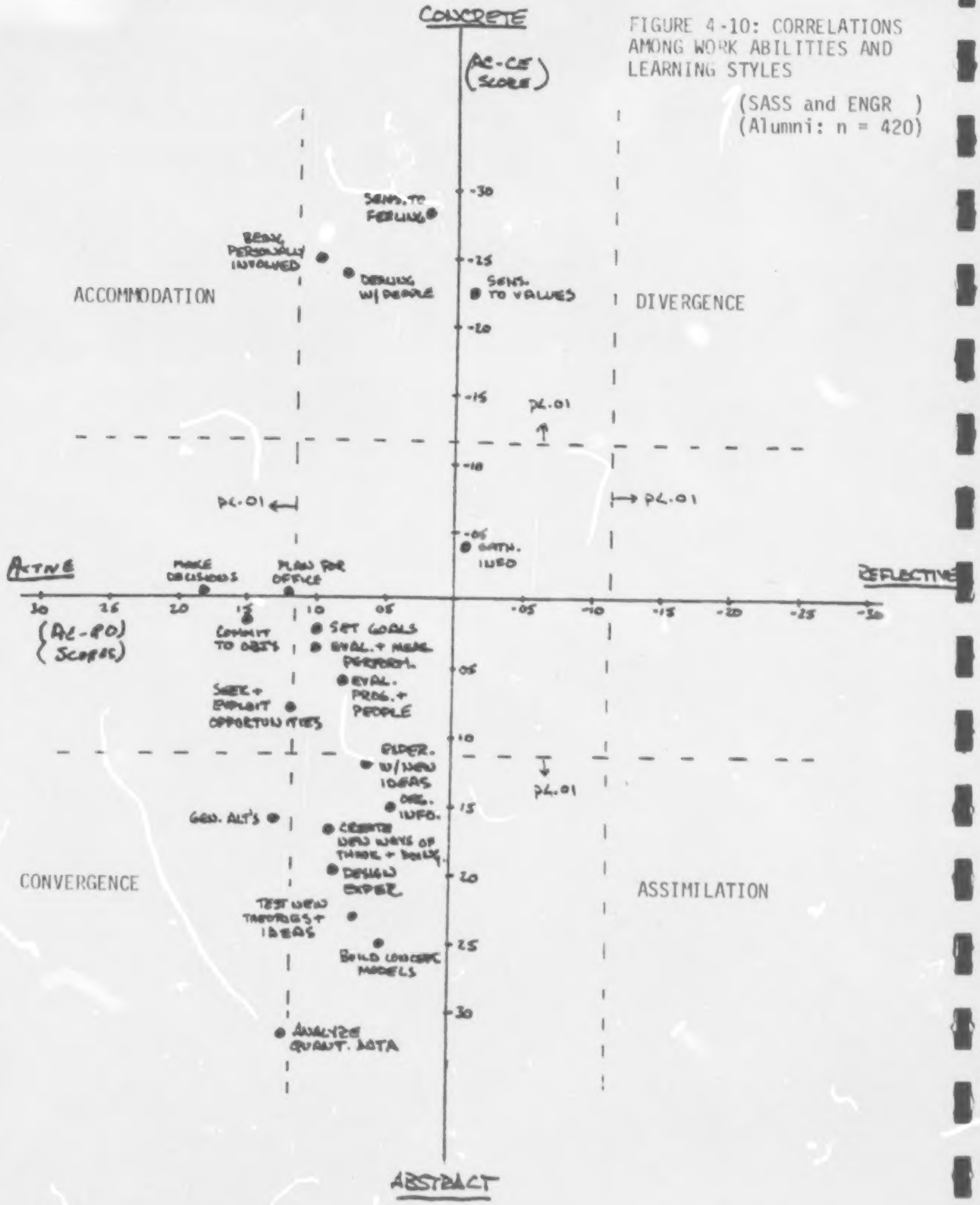


FIGURE 4-10: CORRELATIONS AMONG WORK ABILITIES AND LEARNING STYLES

(SASS and ENGR)
(Alumni: n = 420)

FIGURE 4-11: THE COMPETENCY CIRCLE

Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

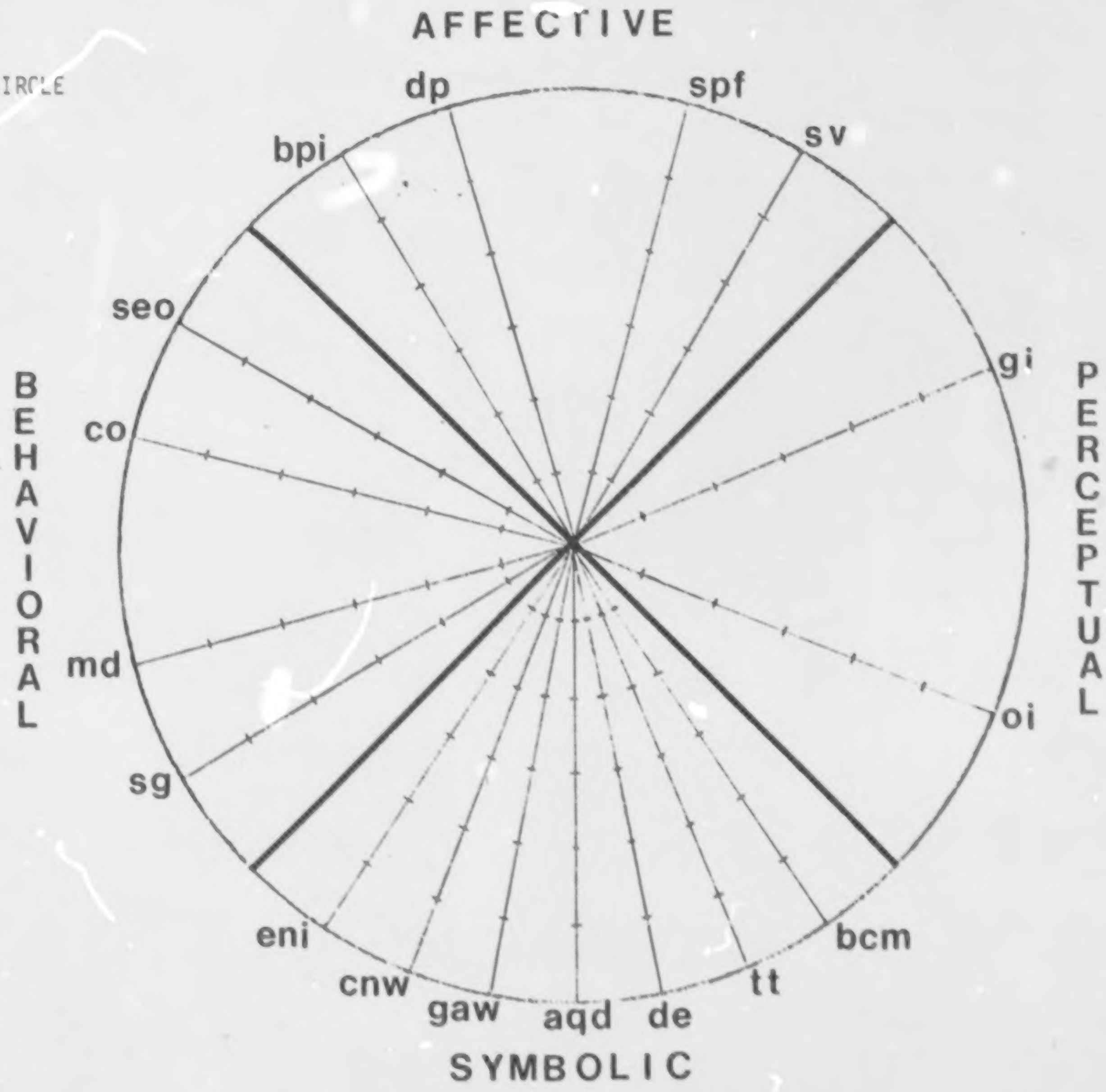
gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals


AFFECTIVE
dp
spf
bpi
sv
seo
gi
co
BEHAVIORAL
PERCEPTUAL
md
oi
sg
eni
bcm
cnw
tt
gaw
aqd
de
SYMBOLIC

There are important problems and limitations in the current taxonomy, however, that need to be addressed in future research and development. First, the current data are all based on respondent self analysis and report. Additional objective behavioral and observational means need to be developed to assess these competencies. Secondly, the perceptual competencies in the current model are of questionable validity since they do not correlate with the LSI Reflective Observation scale. Part of this difficulty stems from the wording of the items (e.g., respondents keyed on "thinking and doing" rather than the intended "creating new ways" in item e). In addition, it is possible that work environments are predominately organized around active as opposed to reflective learning heuristics and that perceptual complexity as a result plays a minor role in performance competencies at work. Thirdly, more work needs to be done on the ecological validity criteria. Some competencies seemed to work well in this respect for educational environments but not for work environments, e.g., the competence of designing experiments. Others seemed relevant to work and irrelevant to education, e.g., seeking and exploiting opportunities. In addition it is doubtful whether the current list encompasses all important performance competencies on all jobs.

Some progress toward overcoming these limitations can be seen in a follow-up study we conducted with social work and engineering graduates in the Professional School study. As a result of the analysis of the alumni data described above the list of performance competencies was revised and expanded to include new performance competencies associated with the four learning competencies (e.g., "influencing and leading others" in the behavioral area). Special emphasis was placed on adding to the list performance competencies that might relate to perceptual complexity. These additions were "working in groups," "listening with an open mind," "able to adapt to changing circumstances," "imaging implications of ambiguous situations," "seeing how things fit in the big picture," and "listening to others." In this study all of these additions were significantly related to perceptual complexity (see Figure 5-1). While some of this success must be attributed to better descriptions of the competencies, the differences between working and student samples must also play a part here. For example, "generating alternative ways of doing things" was seen as convergent by the alumni and divergent by the student. "Designing experiments" required the abstract learning competencies for working alumni but an active orientation for students. These differences may relate to more global environmental demands in education and work rather than to the specific tasks themselves. Thus for a student living in a perceptual and symbolically complex educational environment, designing an experiment may be the most active thing one does; while for the active professional in an affectively and behaviorally complex work environment, designing an experiment seems to require a symbolic orientation by contrast. More objective descriptions of skills and task demands will undoubtedly be a great help in sorting out these inconsistencies.

D. Assessing Learning Competencies: The Adaptive Style Inventory

Glen L. Gish

One specific objective of our research was the further refinement and validation of a new self report instrument for assessing learning style called the Adaptive Style Inventory. This instrument was designed to address some earlier criticisms of the Learning Style Inventory (Freedman and Stumpf, 1980) and specifically to assess situational variability in responses to learning and to assess the developmental level of experiential learning. Progress on this last objective will be reported in detail in the last part of Section IV on the assessment of developmental competencies. This part reports an analysis of the internal properties of the ASI as well as normative and validity data.

The form of the ASI is a 72 item paper and pencil instrument. Each item presents the respondent with a generalized situation indicative of a particular adaptive style and asks the person to choose the best of two provided responses to that situation. The respondent is asked to make a choice on each and every item, even if neither response on a particular item seem personally appropriate. The respondents, in effect, are reporting how they respond behaviorally in certain kinds of situations. The items in the ASI are randomly distributed to encourage the respondents to consider each situation in isolation from the others. However, the items form a definite pattern. Three situational phrases (item stems) are provided to represent each type of situation, i.e., accommodative situations, divergent situations, assimilative situations, and convergent situations. For each situational stem there are six sets of responses provided. There six sets allow a paired comparison between each adaptive mode and every other adaptive mode. A sample of one of the items from an accommodative situation is presented here with the six pair of responses (labelled in parentheses by modal type):

When I start to do something new:

Pair 1:

N. I rely on my feelings to guide me. (concrete experience)
N. I set priorities. (abstract conceptualization)

Pair 2:

N. I try out different ways of doing it. (acitve experimentation)
N. I observe the situation. (reflective observation)

Pair 3:

N. I rely on my feelings to guide me. (concrete experience)
N. I observe the situation. (reflective observation)

Pair 4:

N. I rely on my feelings to guide me. (concrete experience)
N. I try out different ways of doing it. (active experimentation)

Pair 5:

N. I set priorities. (abstract conceptualization)
N. I observe the situation. (reflective observation)

Pair 6:

N. I set priorities. (abstract conceptualization)
N. I try out different ways of doing it. (active experimentation)

The respondent responds to each situational stem six times, each time with a different pair of provided responses. The person responds by circling the number of the response that most accurately describes the response the person most often makes to that situation, given the two choices provided.

Thus, the respondent is provided the opportunity to consider four kinds of situations. Each kind of situation is represented by three sentence stems. Each sentence stem, e.g., "When I try to start a task on time:" is presented six times, each time with a different pair of possible responses. The result is that the respondent makes 72 choices out of 144 available responses. The structure of the instrument can be understood by an illustration:

Four adaptive style situations

each represented by

Three sentence stems

each repeated

Six times

to permit

Four pairs of response combinations which

result in

Seventy-Two items

with

One-hundred forty-four possible responses

out of which

Seventy-two responses are made.

Although three situational stems are provided for each type of situation, only two are actually used in the scoring. The choice of which two stems to use for each type of situation was made in this study on the basis of item analysis of correlations of responses with (a) parallel responses on the Learning Style Inventory, and (b) with the respondent's total use of each adaptive mode, i.e., item-whole analysis.

The paired comparison scoring of the instrument assumes that each stem, though repeated six times, constitutes one scoring unit. For each situational stem a respondent can choose a particular adaptive mode a maximum of three times. This provides a scale of values from zero to three that is possible for each adaptive mode within each situational stem. If the respondent were to choose a concrete response every time a diverger situation is presented, a total score of three could be recorded for each such stem. If the person responded to both viable diverger stems with this concrete kind of response every time, a total score of six could be recorded for that modal response to that kind of situation. The scoring system can be portrayed on circular graphs in terms of total responses and in terms of responses to each kind of situation by each of the four learning modes. Figure 4-13, 4-14, 4-15, 4-16, and 4-17 present the normed graphs on which these scores can be plotted.

Subjects and data collection. Data on the ASI and other tests of learning style were collected from six different samples in addition to the interview sample of engineering and social work alumni described in Section III. These samples were as follows.

This mid-life adults project, sponsored by the Spencer Foundation and conducted at the same time as the NIE research, focused on mid-life adults who were in various stages of transition. To obtain an appropriate sample the research team contacted a large number of people in an attempt to locate people who would be interested in participation in a collaborative research effort into the issues of mid-life adults. Potential respondents were interviewed to determine their appropriateness, both in terms of their interest and availability for extensive interviews and workshop participation, and in terms of the purpose of the study. When respondents were selected, they were extensively interviewed about their life history, current life structure and issues. In groups of approximately fifteen the respondents participated in week-end workshops during which (a) they completed projective exercises portraying numerous aspects of their life space, relationships and structure, (b) completed several instruments to report their orientations and preferences, and (c) were debriefed in small groups, usually triads, by researchers after each exercise.

A sample of engineers from two major industrial firms was provided by Griggs (1980) and Manring (1980) (see Section III-D). A sample of educators was acquired at a conference in Pittsburg, Pennsylvania. A sample of women students including weekday freshmen, week-end freshmen, and juniors from Alverno College in Milwaukee, Wisconsin was provided by that school.

The samples used to analyze the Adaptive Style Inventory are portrayed in Table 4-3 along with indications of the relevant data collected in each sample.

1. Professional Engineers (N = 69). This group was identified by Griggs (1980) and Manring (1980) who solicited participants from two engineering firms in terms of their interest in participation and their fit into a variety of engineering specialities.

2. Professional Engineers (N = 47). The alumni interview sample described in Section III-A.

3. Professional Social Workers (N = 23). The alumni interview sample described in Section III-A.

4. Professional Educators (N = 55). This group were participants in a conference focusing on experiential learning at the University of Pittsburg. They included university, college and high school educators and administrators.

TABLE 4-3

MATRIX OF SAMPLES AND THEIR APPLICATION

SAMPLE	N	Instruments and Variables		
		Adaptive Style Inventory Learning Style Inventory Age, Sex	Ego Development (Sentence Completion) Life Issues	Myers-Briggs Type Indicator Life Structure Variables Variables of the Self
Engineers I	69	X		
Engineers II (NIE)	47	X	X	
Social Workers (NIE)	23	X	X	
Educators	55	X		
Mid-Life Adults (Spencer)	39	X	X	X
Alverno Students	393	X		

5. Mid-Life Adults (N=39). This group were participants in the Spencer project, selected through personal referral and initial interviews in terms of their interest in exploring mid-life issues and of their being representative of people in some stage of transition.

6. Alverno College Students (N=393). The group consists of women students participating in a study of personal development. Members of a class of weekday freshmen, a class of week-end freshmen, and a class of juniors are included in this group.

Mean LSI scores and ASI item scores for these samples are shown in Table 4-4 Table 4-5 shows Total ASI scores by situation and overall.

Internal properties of the Adaptive Style Inventory (ASI). For the purposes of this inquiry it was necessary to perform an analysis of the internal properties of the ASI to establish it as a viable base for measuring adaptation. An item-whole analysis was performed to determine the extent to which each response contributed to the total scores. Table 4-6 presents the results of this analysis. We note that each response contributed significantly to the appropriate total score, e.g., all of the CE responses contributed significantly to the total CE score with correlations ranging from .35 to .75. One RO response and one AE response contributed to their respective total scores at a correlation lower than .30 (DIVROFEL at .23, and DIVAEFEL at .28). The results of this item analysis suggest that all of the items chosen are sufficiently indicative of the adaptive mode which they were intended to portray.

Norms for the Adaptive Style Inventory. The current form of the ASI has been administered to a population sample of 626 respondents. This includes several additional samples to those described above who completed only the ASI. On the basis of this grand sample, norms have been generated by which to compare subsequent populations. Figure 4-13 portrays the normalized distribution of all possible total scores. This distribution was obtained by calculating the Z scores for each possible score using the distribution of the actual sample population, and then converting these Z scores into a normal distribution using a normal distribution table. Figure 4-14 portrays the normalized distribution for those items which are concerned with diverger situations. Likewise, Figure 4-15, 4-16, and 4-17 portray the normalized distributions for those items which are concerned with assimilator, converger and accommodator situations, respectively.

Following the theory of experiential learning and developmental adaptation we would expect that concrete experience responses would be negatively related with abstract conceptualization responses, and that active experimentation responses would be negatively correlated with reflective observation responses. All other relationships should be weak to reflect

TABLE 4-4

ADAPTIVE STYLE INVENTORY VARIABLE DISTRIBUTION: GRAND SAMPLE AGE, SEX, LEARNING STYLE INVENTORY SCORES, ADAPTIVE INVENTORY ITEM SCORES

Variables	Grand Sample		Engineers I		Engineers II		Social Workers		Educators		Mid-Life Adults		Alverno Freshmen I		Alverno Freshmen II		Alverno Juniors	
	N = 628		N = 69		N = 47		N = 23		N = 55		N = 39		N = 146		N = 164		N = 83	
	X̄	SD	X̄	SD	X̄	SD	X̄	SD	X̄	SD	X̄	SD	X̄	SD	X̄	SD	X̄	SD
Age	31.9	10.8	40.8	9.6	35.8	7.5	37.8	8.7	39.3	9.2	42.0	4.7	22.7	7.8	32.3	8.4	23.9	7.7
Sex	73% F		100% M		100% M		72% F		56% F		56% M		100% F		100% F		100% F	
LSI CE	15.5	3.3	13.7	2.6	13.7	3.3	15.2	4.1	14.6	3.8	16.2	3.7	15.8	2.7	16.5	3.2	—	--
LSI RO	13.8	3.8	12.6	2.5	12.4	2.4	13.0	2.8	12.7	5.1	11.6	3.6	15.9	3.9	13.7	3.5	—	--
LSI AC	16.6	3.7	18.5	3.1	18.8	3.1	18.0	4.2	17.7	4.5	16.3	4.3	15.9	3.3	15.6	3.0	—	--
LSI AE	15.7	3.1	17.2	2.6	16.6	2.7	14.6	3.3	15.4	4.1	16.7	2.9	14.9	3.0	15.5	2.8	—	—
LSI AC-CE	1.1	6.2	4.8	4.9	5.2	6.0	2.8	7.8	3.1	7.2	.2	7.1	.1	5.3	-1.1	5.3	--	--
LSI AE-RO	1.9	6.1	4.6	4.4	4.2	4.4	1.6	4.9	2.8	7.6	5.0	5.6	-1.0	6.2	1.8	5.7	--	--
ACCCETSK	.6	.9	.6	.9	.3	.7	.7	.8	.5	.8	.7	.9	.7	.9	.8	1.0	.5	.9
ACCROTSK	1.3	.9	1.3	1.0	1.2	.8	1.2	.8	1.8	.9	.9	.8	1.4	.9	1.2	.9	1.4	.9
ACCACTSK	2.1	1.0	2.0	1.0	2.3	.8	2.0	1.0	2.1	1.0	2.3	.9	2.0	1.0	1.9	1.0	2.2	.9
ACCAETSK	2.0	.9	2.1	.8	2.1	.7	2.1	.9	1.6	.9	2.1	.8	1.9	.9	2.1	.9	1.9	.9
ACCCESTR	.8	.9	.7	.8	.7	.6	.9	1.0	.9	1.0	1.0	1.1	.8	.9	.7	.9	.5	.8
ACCROSTR	1.9	.9	2.1	.8	2.1	.9	2.2	.8	1.5	1.0	1.9	1.0	1.7	1.1	1.7	.9	2.0	.9
ACCACSTR	2.1	.8	2.1	.9	2.3	.7	1.8	1.0	1.9	.8	2.0	.9	2.0	.8	2.1	.8	2.2	.8
ACCAESTR	1.3	.9	1.1	.8	.9	.8	1.0	1.0	1.3	.9	1.2	.9	1.5	1.0	1.5	1.1	1.3	.9
DIVCEFEL	1.2	1.0	1.3	1.0	1.3	1.1	1.5	1.1	1.2	.8	1.8	.9	1.1	.9	1.0	.9	1.0	1.0
DIVROFEL	1.2	1.1	1.1	1.1	1.2	1.0	.7	.8	1.3	1.0	1.2	1.1	1.2	1.1	1.3	1.1	1.3	1.0
DIVACFEL	2.2	.9	2.1	.9	2.0	1.1	2.4	1.0	2.4	.8	2.1	.9	2.3	.9	2.2	.9	2.3	.9
DIVAEFEL	1.4	1.0	1.6	1.1	1.6	1.0	1.4	.9	1.1	1.0	1.0	.9	1.4	1.1	1.5	1.0	1.4	.9
DIVCESEE	1.5	1.0	1.5	1.0	1.6	1.0	1.7	.8	1.5	.9	1.5	1.0	1.4	.9	1.6	1.0	1.5	1.1
DIVROSEE	2.0	.9	2.2	.9	2.1	.8	2.4	1.0	2.0	.9	2.2	.8	2.1	.9	1.9	1.0	1.9	.9
DIVACSEE	1.1	1.0	1.1	.9	1.3	.9	1.3	.9	1.1	.9	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0
DIVAESEE	1.4	1.1	1.2	1.1	1.1	1.1	.7	.9	1.5	1.1	1.3	1.1	1.5	1.1	1.4	1.0	1.5	1.0
ASSCEPRN	1.4	1.1	1.3	1.1	.8	.9	1.2	1.2	1.7	1.2	1.2	1.1	1.5	1.2	1.6	1.2	1.2	1.0
ASSROPRN	1.6	1.0	1.4	.9	1.0	.9	1.6	1.0	1.5	.9	1.7	.9	1.8	.9	1.7	1.1	1.4	1.0
ASSACPRN	1.7	1.1	2.0	1.0	2.1	1.0	1.7	1.2	1.8	1.1	1.6	1.2	1.5	1.1	1.5	1.1	2.1	.9
ASSAEPRN	1.3	.9	1.3	1.1	1.3	1.0	1.5	1.0	1.0	.8	1.4	.9	1.2	.9	1.2	.9	1.3	.9
ASSCEANA	.9	1.0	.7	1.0	.7	.8	1.0	1.2	1.0	1.0	1.3	1.2	.9	1.0	.9	1.0	.6	.8
ASSROANA	1.8	.9	1.7	.9	1.7	.8	1.9	.9	2.1	.7	1.4	1.1	1.8	.9	1.8	.9	1.9	.9
ASSACANA	1.6	.8	1.6	.9	1.9	1.0	1.4	1.0	1.4	1.0	1.3	.9	1.6	.9	1.4	1.0	2.0	.9
ASSAEANA	1.8	1.0	2.0	1.1	1.7	1.1	1.7	1.1	1.5	1.0	2.0	.9	1.8	1.1	1.9	1.0	1.8	1.0
CONCEEVL	1.0	.9	1.1	.9	.7	.9	1.0	.9	1.1	.9	1.3	1.0	1.1	.9	1.0	.9	1.0	.9
CONROEVL	2.1	.9	2.1	.9	2.3	.9	2.0	1.0	2.1	.9	1.9	.9	2.2	.8	2.1	.9	2.4	.8
CONACEVL	1.7	1.0	1.6	.9	1.7	.8	1.5	.7	1.3	1.1	1.5	1.1	1.7	1.0	1.8	.9	1.7	.9
CONAEEVL	1.2	1.0	1.2	1.1	1.3	1.0	1.5	1.0	1.7	1.1	1.3	.9	1.0	1.1	1.2	1.0	1.0	.9
CONCEALT	1.7	.8	1.5	.8	1.5	.8	1.8	.9	1.7	.9	2.1	1.0	1.8	.8	1.7	.8	1.5	.7
CONROALT	2.2	.9	2.2	.9	2.1	.9	2.0	.8	2.0	.9	1.8	.9	2.4	.8	2.2	.9	2.4	.8
CONACALT	1.7	.9	2.0	.8	2.2	.8	1.5	1.1	1.7	1.0	1.3	.9	1.5	.8	1.5	.9	1.9	.9
CONAEALT	.5	.8	.4	.8	.3	.5	.7	.9	.6	1.0	.9	1.0	3.	.7	.7	1.0	.2	.6

TABLE 4-5

ADAPTIVE STYLE INVENTORY VARIABLE DISTRIBUTIONS: SITUATION AND TOTAL SCORES

Grand Sample (N = 626)

	TOTAL		ENG 1		ENG 2		SOCWORK		EDUC		MIDLIFE		ALV F1		ALV F2		ALV JR	
Variable	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
DIVCE	2.7	1.4	2.7	1.6	2.9	1.4	3.2	1.3	2.7	1.4	3.3	1.5	2.5	1.2	2.6	1.4	2.5	1.6
DIVRO	3.3	1.3	3.3	1.4	3.2	1.3	3.1	1.2	3.3	1.2	3.4	1.5	3.3	1.4	3.2	1.4	3.3	1.2
DIVAC	3.3	1.3	3.3	1.3	3.2	1.4	3.7	1.1	3.5	1.3	3.1	1.4	3.3	1.3	3.3	1.3	3.3	1.4
DIVAE	2.8	1.5	2.7	1.6	2.6	1.5	2.1	1.0	2.6	1.5	2.2	1.3	2.9	1.4	2.9	1.5	3.0	1.6
ACCCE	1.4	1.5	1.3	1.4	1.0	1.3	1.6	1.4	1.4	1.5	1.7	1.7	1.5	1.4	1.5	1.5	1.1	1.3
ACCRO	3.2	1.4	3.4	1.4	3.4	1.1	3.4	.9	3.6	1.5	2.8	1.4	3.2	1.4	2.9	1.3	3.4	1.4
ACCAC	4.1	1.4	4.2	1.5	4.6	1.1	3.9	1.6	4.0	1.5	4.2	1.4	4.0	1.4	4.1	1.4	4.4	1.2
ACCAE	3.3	1.3	3.2	1.2	3.0	.9	3.1	1.4	3.0	1.3	3.3	1.4	3.4	1.5	3.6	1.4	3.2	1.3
CONCE	2.7	1.5	2.6	1.5	2.2	1.6	2.9	1.4	2.8	1.5	3.4	1.7	2.9	1.4	2.7	1.5	2.5	1.3
CONRO	4.3	1.4	4.3	1.6	4.4	1.5	4.0	1.4	4.0	1.5	3.7	1.5	4.6	1.3	4.2	1.5	4.8	1.4
CONAC	3.3	1.5	3.6	1.4	3.8	1.3	3.0	1.7	3.0	1.5	2.7	1.7	3.2	1.4	3.3	1.4	3.6	1.3
CONAE	1.6	1.5	1.6	1.5	1.6	1.1	2.1	1.6	2.2	1.6	2.2	1.5	1.2	1.3	1.8	1.5	1.2	1.2
ASSCE	2.3	1.7	2.0	1.7	1.5	1.3	2.2	2.2	2.7	1.8	2.6	1.9	2.4	1.7	2.5	1.7	1.7	1.4
ASSRO	3.4	1.4	3.1	1.3	3.5	1.3	3.4	1.4	3.6	1.3	3.3	1.4	3.6	1.3	3.4	1.5	3.2	1.4
ASSAC	3.3	1.7	3.5	1.5	4.0	1.6	3.1	2.0	3.2	1.8	2.8	1.7	3.1	1.6	2.9	1.6	4.1	1.4
ASSAE	3.1	1.4	3.4	1.6	3.0	1.6	3.3	1.4	2.5	1.3	3.3	1.4	3.0	1.3	3.2	1.3	3.0	1.3
TOTCE	9.0	4.4	8.5	4.5	7.6	4.4	9.8	5.1	9.5	4.7	11.0	4.8	9.3	4.0	9.2	4.3	7.8	4.3
TOTRO	14.2	3.1	14.1	3.1	14.4	2.7	14.0	2.9	14.6	3.2	13.1	3.2	14.6	3.0	13.7	3.2	14.7	3.1
TOTAC	14.0	3.9	14.5	3.7	15.7	3.6	13.6	5.0	13.6	3.9	12.8	4.0	13.6	3.7	13.6	3.9	15.3	3.7
TOTAE	10.8	3.1	10.9	3.3	10.3	2.3	10.6	3.3	10.2	3.1	11.1	2.9	10.2	3.[illegible]	11.4	3.2	10.3	2.8
TACCE	4.9	7.6	6.0	7.2	8.1	7.2	3.8	9.2	4.1	8.1	1.4	7.3	4.3	7.0	4.3	7.5	7.5	7.4
TAERO	-3.4	5.2	-3.2	5.3	-4.2	3.5	-3.4	4.5	-4.4	5.4	-1.6	4.7	-4.1	5.0	-2.3	5.6	-4.4	5.2

TABLE 4-6

ITEM-WHOLE ANALYSIS OF ADAPTIVE STYLE INVENTORY

Grand Sample (N=626)

	ACCCETSK	ACCCESTR	DIVCEFEL	DIVCESEE	ASSCEDEA	ASSCEANA	CONCEEVL	CONCEALT
TOTCE	.49**	.58**	.58**	.35**	.52**	.74**	.61**	.69**
	ACCROTSK	ACCROSTR	DIVROFEL	DIVROSEE	ASSRODEA	ASSROANA	CONROEVL	CONROALT
TOTRO	.34**	.52**	.23**	.38**	.46**	.45**	.53**	.46**
	ACCACTSK	ACCACSTR	DIVACFEL	DIVACSEE	ASSACDEA	ASSACANA	CONACEVL	CONACALT
TOTAC	.57**	.50**	.38**	.32**	.66**	.56**	.50**	.62**
	ACCAETSK	ACCAESTR	DIVAEFEL	DIVAESEE	ASSAEDEA	ASSAEANA	CONAEEVL	CONAEALT
TOTAE	.37**	.52**	.28**	.45**	.41**	.36**	.43**	.39**

** = significance less than .001 one-tail test

where:

TOTCE = Total composite score of the population for Concrete Experience
TOTRO = Total composite score of the population for Reflective Observation
TOTAC = Total composite score of the population for Abstract Conceptualization
TOTAE = Total composite score of the population for Active Experimentation
TACCE = Total composite score of the population for difference of Abstract Conceptualization and Concrete Experience
TAERO = Total composite score of the population for difference of Active Experimentation and Reflective Observation

ACC = Accommodator situation
DIV = Diverger situation
ASS = Assimilator situation
CON = Converger situation

CE = Concrete Experience responses
RO = Reflective Observation responses
AC = Abstract Conceptualization responses
AE = Active Experimentation responses

TSK = Item: When I try to complete a task on time;
STR = Item: When I start to do something new;
FEL = Item: When I consider my feelings;
SEE = Item: When I try to see the world as another person sees it;
DEA = Item: When developing an idea;
ANA = Item: When systematically analyzing something;
EVL = Item: When evaluating an opportunity;
ALT = Item: When deciding between two alternatives;

FIGURE 4-13

ADAPTIVE STYLE PROFILE
Norms for the Adaptive Style Inventory

TOTAL

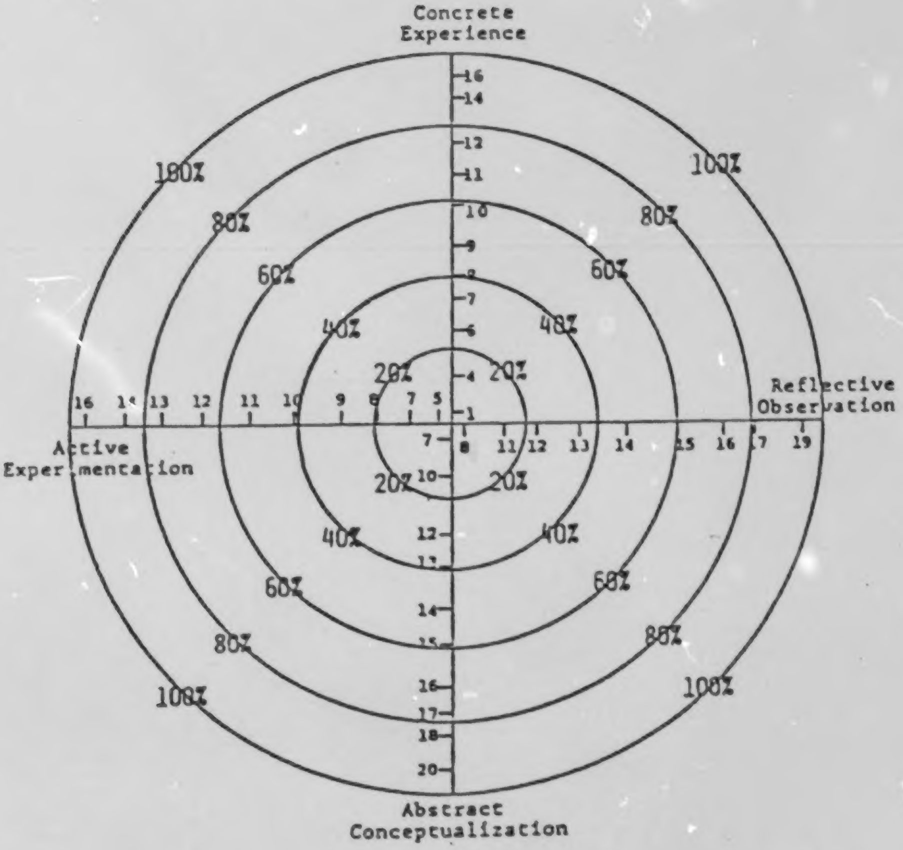


FIGURE 4-14

ADAPTIVE STYLE PROFILE

Norms for the Adaptive Style Inventory

DIVERGER SITUATIONS

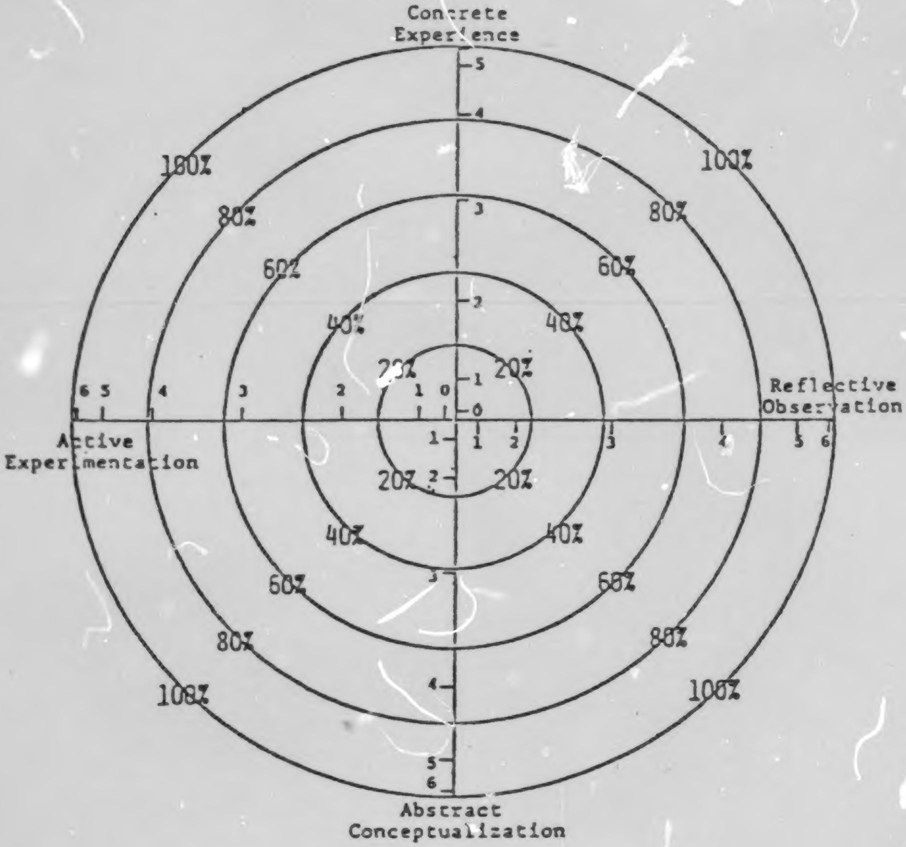


FIGURE 4-15

ADAPTIVE STYLE PROFILE

Norms for the Adaptive Style Inventory

ASSIMILATOR SITUATIONS

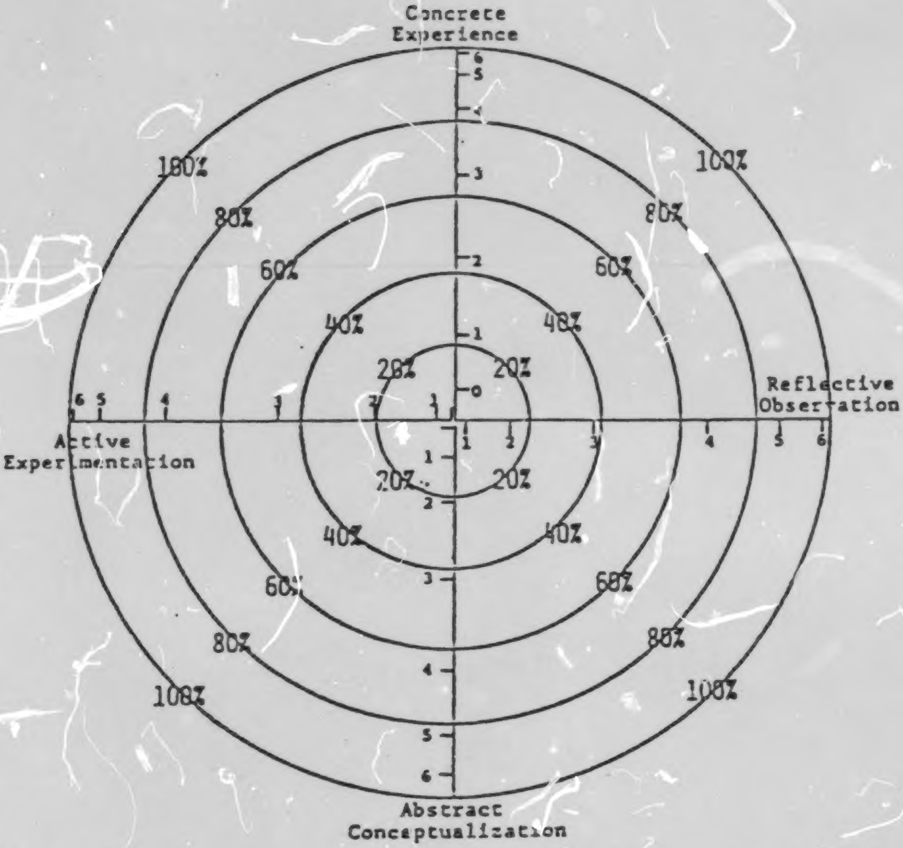


FIGURE 4-16

ADAPTIVE STYLE PROFILE

Norms for the Adaptive Style Inventory

CONVERGER SITUATIONS

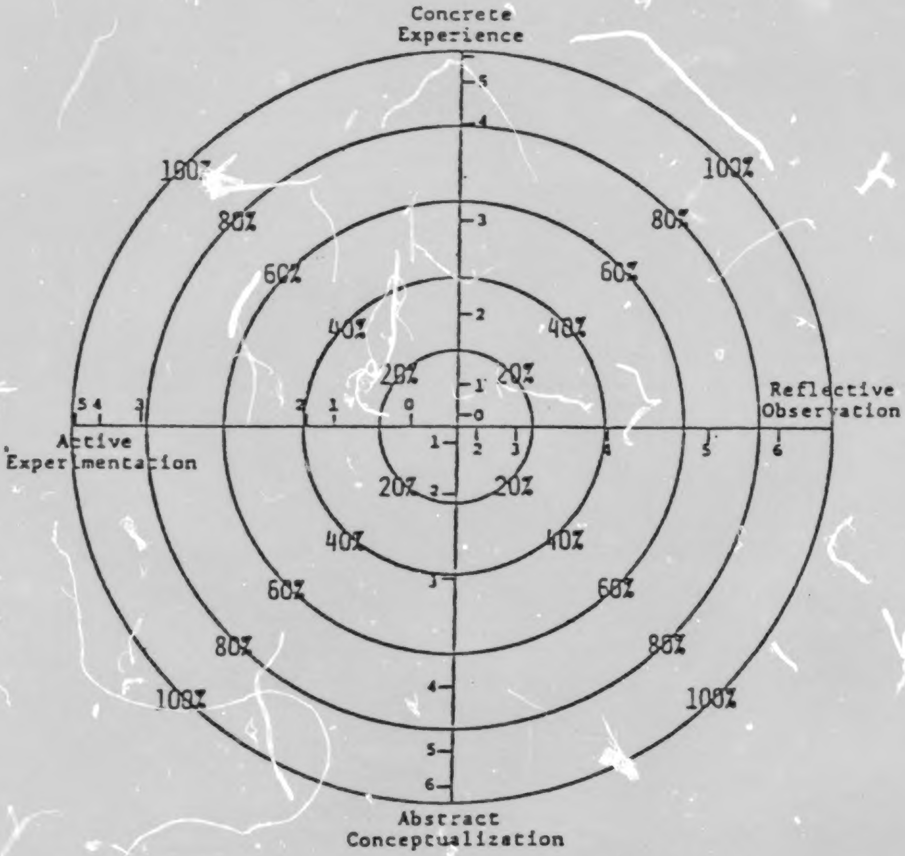
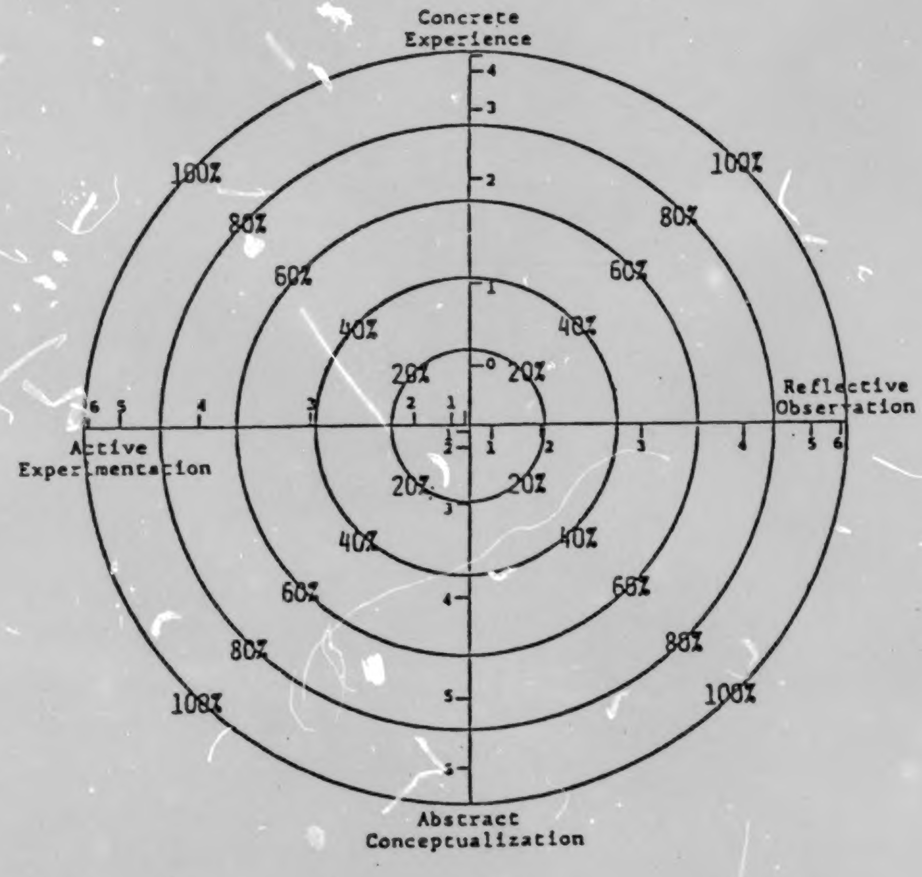


FIGURE 4-17

ADAPTIVE STYLE PROFILE

Norms for the Adaptive Style Inventory

ACCOMMODATOR SITUATIONS



the orthogonal relationship of the two dimensions of abstract-concrete and active-reflective adaptive modes.

Table 4-7 reports the relationships among the total scores. The abstract conceptualization score is negatively related to the concrete experience score as expected. Also, the active experimentation scores is negatively related to the reflective observation scores as expected. However, the negative relationships between the concrete experience and reflective observation scores, and between the abstract conceptualization and active experimentation scores are stronger than expected. The lack of relationship between the concrete experience and active experimentation scores, and between the reflective observation and abstract conceptualization scores confirms our expectations.

Thus, while the dialectic relationships are well established in this instrument, the orthogonal relationships are not as well established. Table 4-8 reports the relationships among the total scores and the situation scores with similar results.

Reliability of the Adaptive Style Inventory. The reliability of the Adaptive Style Inventory was determined by performing a split-half reliability test. To investigate reliability using the split-half method, each of the four basic ASI scales were split into halves, taking all available item statistics into consideration, and pairing items that most resemble each other and correlate most highly. The resulting odd and even halves "should represent faithfully the total test in all significant respects" (Guilford, 1954, p. 373). The odd and even halves for each ASI scale are represented in Table 4-9. In addition, the correlations between the halves of each scale are indicated at the end of each list of items. Next to the correlations are the reliability coefficients (R.C.) derived by using the Spearman-Brown prophecy formula. The results demonstrate reliability coefficients from .76 and .89.

Validity of the Adaptive Style Inventory. The Adaptive Sylte Inventory is derived from the developmental model of experiential learning theory. As such it should compare favorably with the Learning Style Inventory, which can serve as a criterion of validity. On the other hand, the construction of the two instruments is sufficiently different--the LSI is a learning preference instrument and the ASI is a self-report of adaptive behaviors--that we would expect somewhat weakened relationships between comparable modes and dialectically related modes.

As expected, the significant and substantive relationships between the LSI and the ASI comparable variables confirm the dialectical nature of the abstract-concrete and active-reflective dimensions as well as confirm the absence of relationship of learning-adaptive modes compared across dimensions, i.e., concrete with active or reflective, and abstract with active or reflective learning/adaptive modes. Table 4-10 reports

TABLE 4-7

INTERCORRELATIONS OF TOTAL SCORES OF ADAPTIVE STYLE INVENTORY

Grand Sample (N = 626)

	TOTCE	TOTRO	TOTAC	TOTAE	TACCE	TAERO
TOTCE	1.00**	-.49**	-.69**	-.06	-.93**	-.25**
TOTRO		1.00**	.10	-.44**	.33**	-.85**
TOTAC			1.00**	-.37**	.91**	-.28**
TOTAE				1.00**	-.15**	.85
TACCE					1.00**	-.29**
TAERO						1.00**

** = significance less than .001 one-tail test

Where:

TOTCE = Total concrete experience adaptive mode
TOTRO = Total reflective observation adaptive mode
TOTAC = Total abstract conceptualization adaptive mode
TOTAE = Total active experimentation adaptive mode
TACCE = Total abstract-concrete difference
TAERO = Total active-reflective difference

TABLE 4-8

CORRELATIONS OF ADAPTIVE STYLE INVENTORY TOTAL SCORES AND SITUATION SCORES

Grand Sample (N = 626)

	TOTCE	TOTRO	TOTAC	TOTAE	TACCE	TAERO
DIVCE	.63**	-.26**	-.38**	-.16**	-.55**	.06
DIVRO	-.06	.43**	-.12*	-.20**	-.03	-.38**
DIVAC	-.28**	-.02	.49**	-.20**	.41**	-.10*
DIVAE	-.30**	-.13**	.03	.52**	.19**	.38**
ACCCE	.73**	-.37**	-.53**	-.01	-.69**	.21**
ACCRO	-.29**	.59**	.12*	-.33**	.23**	-.54**
ACCAC	-.48**	.08	.68**	-.25**	.63**	-.19**
ACCAE	.01	-.29**	-.26**	.61**	-.14**	.53**
CONCE	.76**	-.35**	-.53**	-.06	-.71**	.17**
CONRO	-.47**	.60**	.25**	-.24**	.40**	-.49**
CONAC	-.57**	.15**	.72**	-.23**	.70**	-.23**
CONAE	.26**	-.39**	-.41**	.53**	-.36**	.54**
ASSCE	.78**	-.43**	-.57**	.03	-.74**	.27**
ASSRO	-.26**	.62**	-.03	-.22**	.14**	-.50**
ASSAC	-.49**	.06	.75**	-.30**	.66**	-.21**
ASSAE	-.12*	-.16**	-.17**	.55**	-.02	.41**

* = significance less than .01
** = significance less than .001

one-tail test

Where:
CE = concrete experience adaptive mode
RO = reflective observation adaptive mode
AC = abstract conceptualization adaptive mode
AE = active experimentation adaptive mode
TOT(T) = total
ACCE = abstract-concrete difference
AERO = active-reflective difference
DIV = Diverger situations
ACC = Accommodator situations
CON = Converger situations
ASS = Assimilator situations

TABLE 4-9

SPLIT-HALF RELIABILITY OF ADAPTIVE STYLE INVENTORY

Grand Sample (N = 626)

Situations	Concrete Experience		Reflective Observation		Abstract Conceptualization		Active Experimentation	
ACCommodator	TSK	STR	TSK	STR	TSK	[illegible]	TSK	STR
DIVerger	SEE	FEL	FEL	SEE	SEE	FEL	SEE	FEL
ASSimilator	PRN	ANA	ANA	PRN	PRN	ANA	PRN	ANA
CONverger	ALT	EVL	ALT	EVL	EVL	ALT	ALT	EVL
	r = .6178*		r = .6550*		r = .8079*		r = .6996*	
	R.C. = .7638		R.C. = .7915		R.C. = .8937		R.C. = .8233	

Note: r = correlation between halves of each scale
R.C. = reliability coefficient of each scale

*significance less than .001 one-tail test

TABLE 4-10

CORRELATIONS OF TOTAL SCORES OF THE LEARNING STYLE INVENTORY (LSI) AND THE ADAPTIVE STYLE INVENTORY (ASI)

Grand Sample (N = 626)

	ASI TOTCE	ASI TOTRO	ASI TOTAC	ASI TOTAE	ASI TAC-CE	ASI TAE-RO
LSI CE	.32**	-.09	-.28**	-.01	-.33**	.05
LSI RO	.06	.19**	-.08	-.16**	-.07	-.21**
LSI AC	-.25**	.02	.34**	-.10*	.32**	-.08
LSI AE	-.01	-.11*	-.05	.18**	-.03	.17**
LSI ACCE	-.32**	.06	.35**	-.06	.36**	-.07
LSI AERO	-.04	-.17**	.03	.19**	.03	.22**

** significance less than .001

* = significance less than .01

one-tail test

Where:
CE = concrete experience learning mode
RO = reflective observation learning mode
AC = abstract conceptualization learning mode
AE = active experimentation learning mode
ACCE = difference between AC and CE
AERO = difference between AE and RO

these relationships.

The Adaptive Style Inventory as related to Jungian personality types. Experiential learning theory is derived in part from the contributions of Jung (1971) whose presentation of psychological types provides a structure of personality based on polarities of personal characteristics. The basic polarity he suggests is introversion-extroversion. The other polarities within this basic one include sensing-intuiting, thinking-feeling, and judging-perceiving. These polarities do not correspond directly to the dimensions in the experiential learning theory. However, we would expect some similarities, e.g., the thinking-feeling polarity would parallel the abstract-concrete dimension. The Myers-Briggs Type Indicator (MBTI) instrument indicates these Jungian types. It, however, does not serve as a criterion for validating the ASI. We compare the variables from the two instruments to explore what relationships do exist.

Table 4-11 reports the relationships between the total ASI scores and the MBTI scores. No significant relationships are found between the introversion and extraversion scores, and the ASI total scores. However, concrete experience relates positively and significantly to intuiting (.39) and perceiving (.37), and without significance to feeling (.18). Abstract conceptualization relates positively and significantly to sensing (.45), thinking (.27), and judging (.39). These relationships are confirmed by negative relationships of concrete experience with sensing, thinking and judging, and of abstract conceptualizating with intuiting, feeling and perceiving. None of the Jungian variables appear to relate to the active experimentation and reflective observation scores of the ASI.

Summary. The ASI on the basis of data reported here seems to be a useful tool for assessing the generalized adaptive orientations described by experiential learning theory. It has high split half reliability, and correlates with the LSI as predicted. The internal structure of the instrument is consistent with experiential learning theory although RO shows a strong negative relationship to CE and similarly AE is negatively correlated with AC. This finding coupled with the lower correlations between ASI and ASI AE and RO scores and the lack of a relationship between ASI AE and RO and introversion/extroversion on the MBTI (a finding shown in several studies with the LSI) suggests some caution in interpreting the AE and RO scores.

TABLE 4-1

CORRELATIONS OF ADAPTIVE STYLE INVENTORY SITUATION SCORES WITH JUNGIAN PERSONALITY TYPE SCORES ON MYERS-BRIGGS TYPE INDICATOR

Mid-Life Adults (N = 39)

	Extraversion	Introversion	Sensing	Intuiting	Thinking	Feeling	Judging	Perceiving
TOTCE	-.11	.12	-.44**	.39**	-.25**	.18	-.37**	.37**
TOTRO	.01	.01	.09	.01	.17	-.16	.05	-.03
TOTAC	-.01	-.03	.45**	-.43**	.27*	-.21	.39**	-.40**
TOTAE	.18	-.16	-.00	-.06	-.14	.15	.02	-.04
TACCE	.06	-.09	.47***	-.43**	.28*	-.21	.40**	-.41**
TAERO	.09	-.10	-.06	-.04	-.18	.18	-.02	-.01

* significance less than .05
** significance less than .01 one-tail tests
*** significance less than .001

E. Assessing Learning Competencies: Behavioral Measures of Learning Style

Most research on learning styles has used self report inventories to assess learning orientations (Kirby, 1979). While these measures have proven quite useful and capable of predicting behavior meaningfully we feel that it is important to distinguish between individuals' self descriptions of their learning behavior and their actual behavior in a learning or problem solving situation. Thus we need to develop meaningful behavioral measures of the constructs in experiential learning theory to complement the self report indices of the Learning Style Inventory and the Adaptive Style Inventory. The combination of behavioral and self report measures should yield more accurate assessments of individual learning orientations and better empirical tests of the predictions of experiential learning theory. We do not mean to imply however, that behavioral and self report indices should be identical for a given individual or should even predict the same outcome behaviors. Self reports, for example, may be better predictors of outcomes like career preferences than would performance on behavioral tests, since career preferences are themselves based on self-perception of one's capabilities and actual performance.

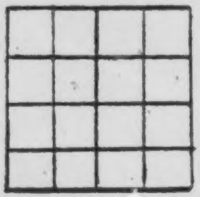
We have encountered major problems in the design and development of behavioral measures of adaptive competences particularly in the areas of affective complexity and perceptual complexity. We first encountered these problems when pretests of preliminary instruments created situational demands that tended to overshadow the display of affective or reflective competence. For example, in a test designed to assess reflective observation, reflective people (as measured by LSI score) tended to hurry through the test and thus scored poorly. In debriefing they reported that they did not like tests and preferred to reflect on what they were concerned about, not what a test dictates. A similar problem occurs in assessing intuitive skills associated with affective complexity. When we ask subjects to report how they solve problems they tend to make their reports more systematic then they actually behave, apparently because an assessment condition makes a more analytic systematic response seem appropriate. In our attempts to deal with these problems, we formulated the concept of "maximum press testing" where we attempt to create test conditions and instructions that are most conducive to display of the particular competence being measured. In this approach we try to assess what an individual can do under optimal conditions, i.e., assess his potential for display of a given adaptive competence. The LAMP study of the learning process reported in Section IV-B resulted from this approach. In that study we tried to offset the convergent press of the testing situation by creating a relaxed permissive atmosphere that encouraged play and reflection with no pressure for a correct answer. This approach was only partially successful in our judgment and the problem of creating assessment devices that clearly encourage subjects to demonstrate fully the competence being assessed still remains.

In spite of this concern we chose two behavioral tests that on the basis of theory and research should be related to the learning orientations described by the abstract/concrete (AC-CE) and active/reflective (AE-RO) dimensions of experiential learning theory for administration to the alumni interview sample. Such a comparison between self-report and behavioral measures of these constructs seemed important.

The first test was the Witkin Group Embedded Figures Test (GEFT). The pattern of correlates of this widely used test of analytical vs. global functioning are very similar to those of the abstract/concrete dimension of experiential learning theory. The abstract/analytic orientations are associated with competence in analytic functioning, preference for scientific and technical jobs and symbolic learning while the concrete/global orientations are related to interpersonal functioning, preference for human relations jobs and affective learning (Kolb, 1981; Witkin, 1962, 1973).

The second test was created as an adult modification of Kagan's impulsivity/reflection dimension (Kagan and Kogan, 1970). His research suggests a relationship between reflection and reflective observation and impulsivity and active experimentation. The test includes items that have an easily obtained impulsive answer and other answers that become apparent on reflection. One sample item is included below.

"How many squares are there in this figure?"



On the basis of pretests 12 such items were included in an individually administered test that we called the Perception Reaction Test (PRT). In addition to scoring content answers to the test (in the above example 0-16=0, 17-22=1, and 22-32=2 where a 2 indicates high reflection) interviewees also noted the respondents' process of taking the test on three dimensions: number of pre-solutions degree of certainty in response and time taken to respond. The complete PRT and interviewee scores sheet are shown in Appendix F.

A total of 71 cases from the alumni sample completed the GEFT and PRT. Our first step in analysis of the PRT was to refine the instrument through analysis of the frequency distributions of item responses and item whole correlation. Through these procedures we chose the six best items for inclusion in the final PRT content score. These items along with their respective item whole correlations are -- 1(.83), 2(.66), 3(.67), 5(.50), 7(.65) and 8(.66). The sum of an individuals score on these six items constituted his score on the PRT. Actual scores ranged from 0 to 12 with a mean score of 4.78.

GEFT scores were computed according to the recommended procedure (Witkin, et al., 1971). Note that the group form of the test was used even though it was administered individually. This was done to save time in the interview. Scores on the GEFT ranged from 1 to 18 with a mean of 13.57.

The scores for all 71 respondents to the two tests are shown in Figure 4-18 using the GEFT as a measure of the abstract/concrete dimension of the two dimensional learning style space and the PRT as the measure of the active/reflective dimension. This orthogonal treatment of the two variables is not quite justified since there was a slight correlation between the PRT and GEFT of .21 ($p < .05$), but we do it to facilitate comparison with LSI results for the same data. Subjects are indicated by profession and cohort year, e.g., S1 equals social work class of 1975 and E5 equals engineering 1955. The average score for social workers is indicated by the circled "S" and for engineers by the circled "E." The sample means are shown by the circled "$\bar{x}$." The fact that social workers are significantly more global than engineers fits the Witkin theory. The pattern of results in this figure is nearly the same as the results shown by the LSI (see Section III-Figure 3-1 which shows social workers as significantly more concrete than engineers. This is in spite of the fact that GEFT scores are highly skewed with 18% of the respondents achieving perfect scores. The GEFT seems too easy for engineers in particular.

Other validity data for the PRT comes from the correlation of the content score with the interviewer process rating. This correlation was .58 ($p < .01$) indicating that individuals who achieved reflective answers were perceived as behaving reflectively

Other validity data for the two tests comes from correlations with subjects ratings of their performance competencies as described in Section IV-C. These correlations are reported in Figure 4-19 in the same fashion as the corresponding correlations with the LSI in Figures 4-11 and 4-12. While fewer self rated competencies correlate with the GEFT and PRT (those correlations less than .10 are not depicted) the pattern of results is similar to the LSI results particularly for the GEFT.

Given this moderately positive construct validation for the two behavioral measures we were greatly surprised to find no relationship between the PRT and GEFT and the LSI; or for that matter between the behavioral tests and any self report measure of learning style. Table 4-12 reports correlations among the PRT and GEFT and four different self report measures of the learning competencies used in this study - the LSI, the ASI, the average of the performance competencies related to each learning mode (PC), and a seven point Likert scale self rating in each mode by

FIGURE 4-18

Social Work and Engineering Alumni
Scores on GEFT and PRI

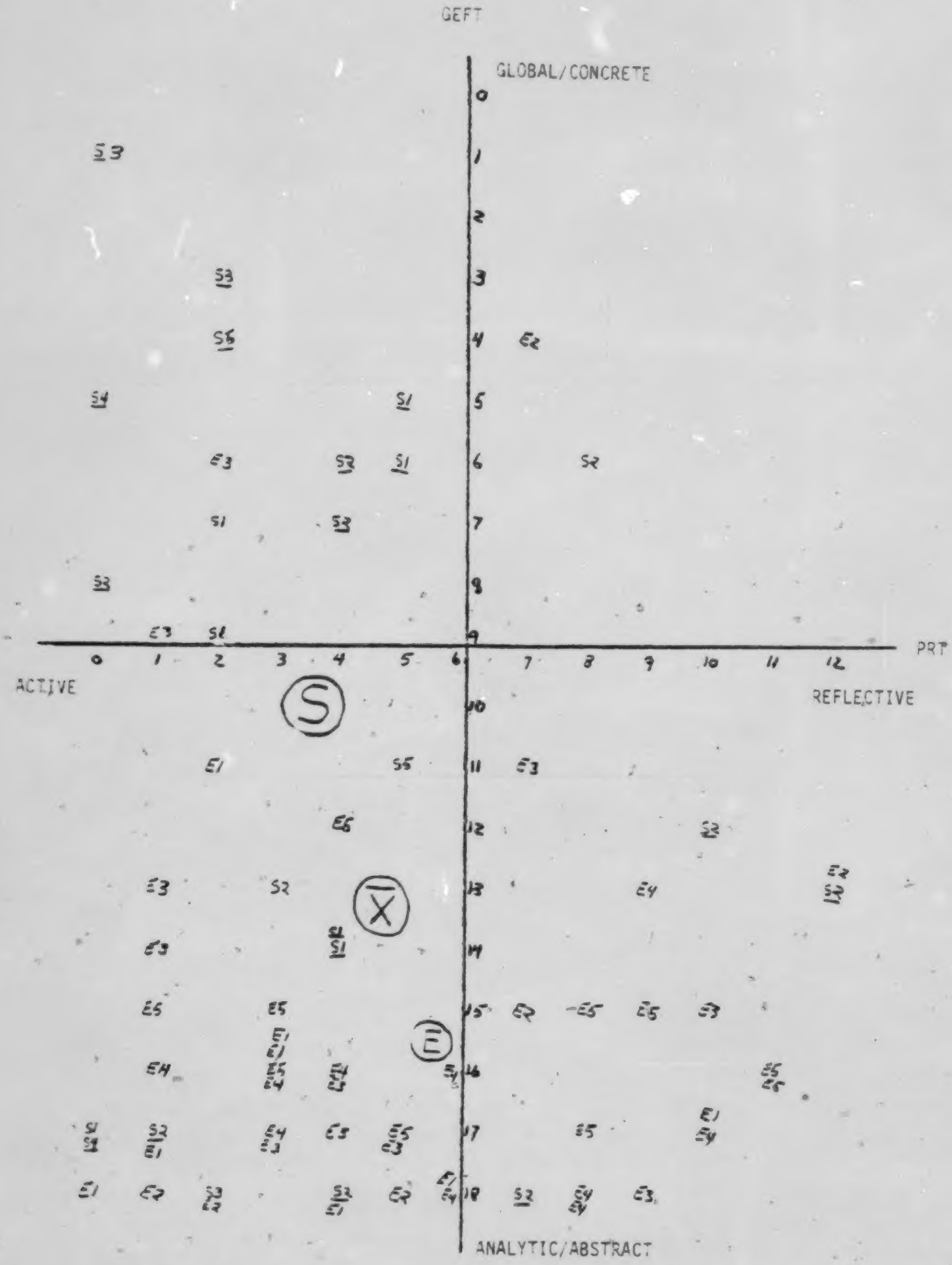


FIGURE 4-19

Correlations Between Performance Competencies
and PRT and GEFT (n=66)
Social Work and Engineer Alumni

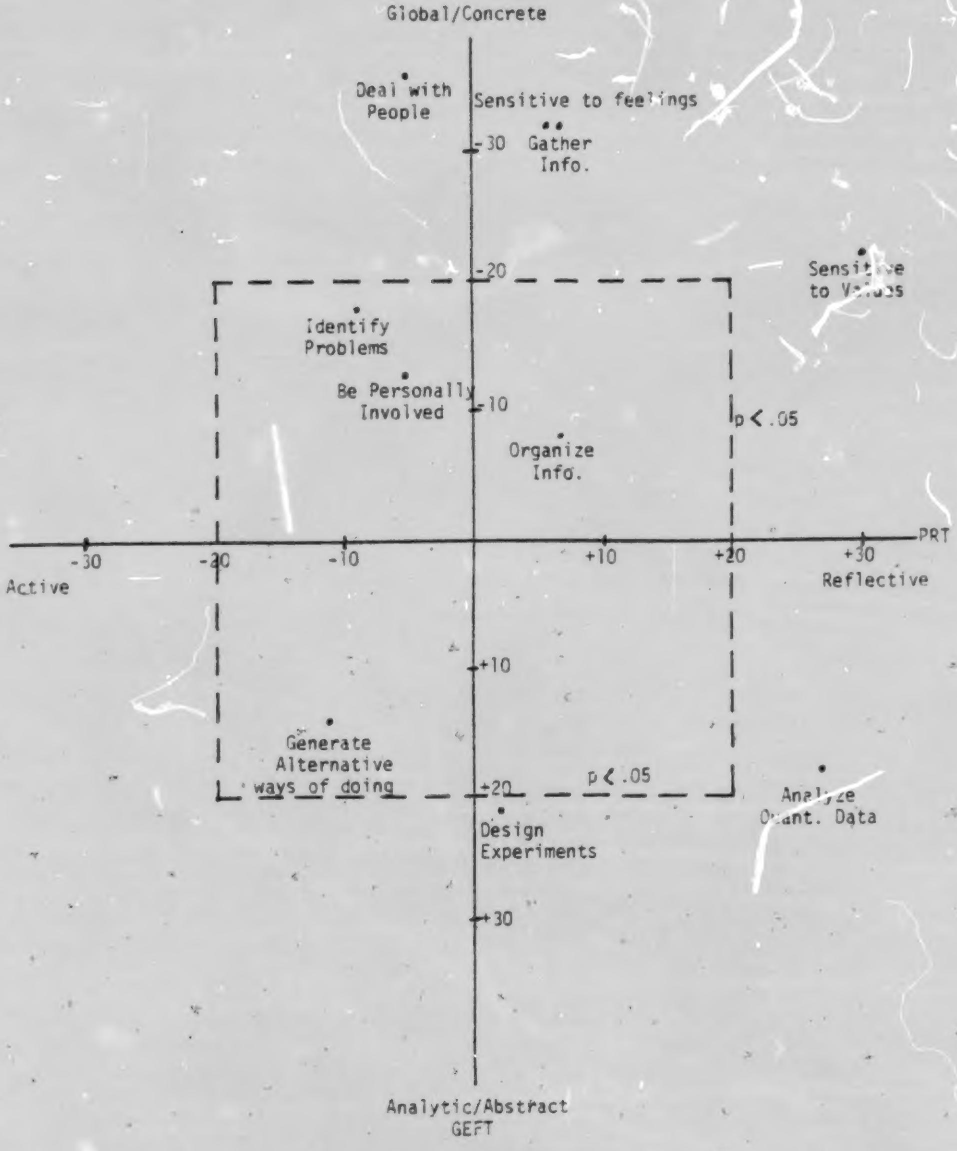


TABLE 4-12

Correlations Among Several Self-Report Measures of Learning Style and the PRT and GEFT

	Concrete Experience	Reflective Observation	Abstract Conceptualization	Active Experimentation	Abstract/ Concrete	Active/ Reflective
LSI - PR & GEFT n = 70	.01	.04	-.06	.00	-.04	-.02
ASI - PR & GEFT n = 58	-.07	-.11	.12	-.07	.11	.02
PC - PR & GEFT n = 70	-.32**	.00	.17	-.03		
ACS - PR & GEFT n = 58	.11	.01	.06	-.03		
LSI - ASI n = 629	.32***	.19***	.34***	.18***	.36***	.22***
LSI - PC n = 70	.27*	.08	.32**	.22*	CE -.24* AC .38***	RO -.10 AE .23*
LSI - ACS n = 58	.49***	.22*	.27*	.37**	CE -.42*** AC .36**	RO -.18 AE .43***
ASI - ACS n = 58	.24*	-.07	.31**	.37**	CE -.30** AC .33**	RO -.22* AE .22*
ASI - PC n = 58	.16	-.12	.06	.22*	CE -.10 AC .19	RO -.21* AE .22*
PC - ACS n = 58	.31**	-.07	.24*	.48***		

* = p .05
** = p .01
*** = p .001

Test Code:

LSI = Learning Style Inventory
PRT = Perception Reaction Test

Test Code:

LSI = Learning Style Inventory

PRT - Perception Reaction Test

GEFT= Group Embedded Figures Test

ACS = Adaptive Competency Scales

ASI = Adaptive Style Inventory

PC = Performance Competencies

interview respondents, called the Adaptive Competence Scales (ACS)(see Section V-C for details). With the exception of the predicted relationship between GEFT scores and the performance competencies associated with concrete experience and affective complexity (-.32, $p < .01$) the correlations are virtually zero. This is in spite of the fact that the four self report measures are significantly intercorrelated in the predicted manner with the exception of reflective observation which suffers primarily from our failure to identify performance competencies strongly associated with this learning competence. Additionally, it seems that reflection is difficult to assess with any test that requires behavior be it test performance or self report.

Thus we are left with something of a puzzle. Behavioral tests of the learning competencies have some construct validity similar to self report tests particularly the LSI, but do not correlate directly with these self report tests. Further research is clearly needed in this area.

F. Assessing Developmental Competencies: The Concept of Adaptive Flexibility

Glen L. Gish

The process of development continues for people throughout their lives. The path is sometimes clear, though often it is obscure. For adults movement toward an enhanced life, a life filled not only with reasonable comfort and social success but with understanding and a sense of full participation, is an uneven experience. Adults are often heard to say, What is the qualify of a full life, and how do I attain it? This inquiry attempts to suggest a path to adult development derived from the insights of many writers. That path begins when people start to develop skills, but without a clear sense of what the skills mean or how these skills will make a difference in their interactions with others and the world in general. As a person enters young adulthood the path becomes well lighted by interactions with people, organizations, society, culture and the physical world. But the interactions are many and the portions of the path they light are enticing to some over here, to others over there. As a person chooses a particular part of the path, that part becomes even more well lighted. The person can continue on this part of the path to development for the rest of his life, sharpening his skills, fitting into roles that are appropriate to his needs and to the needs of the world about him. But the parts of the path to development that are not illuminated by the particular interactions he has chosen to pursue begin to intrigue some people, trouble others, and to be ignored by still others. To broaden the path on which one is moving, to be able to enter into other interactions, to have access to more of the breadth of life's procession; this takes special qualities. The choices of where to walk on the path to development can be as narrow or as broad as a person desires. But the choice to broaden the path on which one walks toward development involves a certain amount of flexibility and a willingness to deal with more of life including more of the complexities of life. This inquiry seeks to describe some of the dimensions of the broader path to development and to add some insights to help illuminate the way to more parts of the path and to engage in the developmental opportunities that are to the sides of a person as well as in front on the path of life.

Life is lived in a context. Development occurs within that context. People learn by interacting with others and their general environment. As they interact they experience change in themselves, and the parts of the environment with which they interact change, too. The result is a continuing adaptation between the person and his environment. With continuing adaptation the interactions between a person and his environment become more complex. But, the extent of complexity that can be experienced depends in many ways on the complexity of the ways a person adapts within his world. To generate more complex ways of adapting, to broaden the path to development, a person must find ways to use these ways in a manner that has one way complementing another. As more ways of adapting combine and share their light the complexities of life can be seen with clarity. Seemingly disparate parts of life become integrated one with the other. Together they become something new for the person. This something new represents a broadening of the path to development. More of life can be experienced. The range of choices a person can exercise increases. But the path to integrative complexity is filled with problems, with questions, with uncertainty. To broaden the path of development to include increasing complexity means to wrestle with these problems, questions and uncertainty. When one of these yields to one's efforts to comprehend and experience the complexity behind it, another one pops up to take its place. Such is the broadened path to development.

The goal of development is viewed in this inquiry as increasing integrative complexity. The path to this goal is made up of the processes of life, the ways we go about learning, working and living. People can use the processes of feeling, reflecting, thinking and acting selectively or in complementary ways. The extent to which a person can use all of these processes in the service of development will, in large part, determine the extent and quality of that development. Associated with the integration of these processes, we suggest, is the process of flexibility. To the extent that a person adapts within his environment the contribution of an adaptive flexibility may be important, even critical. This inquiry takes a first step in determining the relationship of adaptive flexibility to the processes of development as conceived by experiential learning theory.

Operationalizing Adaptation. The experiential learning theory provided the conceptual framework for the creation of an instrument to provide a profile of a person's preferred learning style, the Learning Style Inventory (Kolb, 1976). The developmental aspects of that theory plus the added perspective of person-environment transactions gave rise to another instrument; the Adaptive Style Inventory. This instrument profiles the transactions between a person and the environment by providing a person a series of situations in the form of sentence stems to which the person makes a choice between two responses, each response representing an adaptive mode. By varying the situations and the possible choices for each situation, the respondent can report how he behaves typically in these different kinds of situations. In effect, the respondent is placed in a situation that calls for a response that reflects a certain learning/adaptive style. If the person responds in terms of the environmental press he will, when possible, choose adaptive modal responses appropriate to that press. Of course, he may choose otherwise. By providing numerous opportunities for a person to report his typical behavior he can report a range of responses that result in a profile of his transactions with the environment. That profile includes a general distribution of his use of adaptive modes and a distribution of his use of the adaptive modes in each of the four kinds of situations. This instrument is described in detail in

Section IV-D. We note it here as a way of further clarifying our concept of adaptation.

The implications of operationalizing adaptation in this way raises the issue of whether we are concerned with a state or a trait of a person. Is adaptation a psychological process measured by the responses a person makes to situations, the responses indicating traits of adaptation? This position would hold that adaptation is a process of increasing integrative complexity of a person's internal structures. On the other hand, is adaptation a social-psychological process measured by the responses a person makes to shifting situations, the responses indicating states of adaptation? This position suggests that adaptation is a process of increasing integrative complexity of the transactions between the person's internal structures and the environment. The design of the Adaptive Style Inventory is intended to capture the latter form of adaptation. In the instrument the environment continually changes from one situation to another. The person responds to each situation by reporting his most likely behavior in that situation given two options which represent adaptive mode responses. In effect, the transactions of the person and the environment are captured in terms of a person's typical behavior in four types of situations. The implications of this strategy, focusing on adaptive states, impact on the interpretation of this research. The issue of state versus trait cannot be settled by fiat but this inquiry is guided by an orientation to adaptive states.

Developmental Models. The central process of development for adults is movement toward a state of integration, which is developed by an increasing complexity and relativism among a person's adaptive modes. Integration of the person's internal structures interpenetrates with the transactions between the person and the environment. When we speak of a state of integration we are focusing not only on the traits of a person but on the transactions between the person and the environment which are increasingly complex as the internal structures of the person increase in complexity and the environment increases in complexity.

Kolb and Fry--Development within Experiential Learning Theory. This theme of development is presented by Kolb and Fry (1975) who present a stage model of development.

> The first stage, *Acquisition*, extends from birth to adolescence and marks the acquisition of basic learning abilities and cognitive structures. The second stage, *Specialization*, extends through formal education and/or career training and the early experiences of adulthood in work and personal life. In this stage development primarily follows paths that

> accentuate a particular learning style. . . .The third stage, Integration, is marked by the reassertion and expression of the non-dominant adaptive modes (p. 41).

This model specifies three steps in the progression toward increasing complexity and integration (see Figure 4-20). Development is characterized by shifts in the adaptive modes, which are representative of kinds of transactions between the person and the environment. The person develops a set of skills in the context of an environment but the person is not aware of the transactive quality of his skills and the environment. He does not differentiate his self from the world. As this acquisition stage shifts into specialization the transactive quality begins to be a salient feature of development. Increases in complexity are made possible at this stage by a collusion between the person and the environment. Kolb and Fry note that:

> Stability and change in life paths are seen as resulting from the interaction between internal personality dynamics and external social forces. . .The most powerful developmental dynamic that emerges from this interaction is the tendency for there to be a closer and closer match between self-characteristics and environmental demands. This match comes about in two ways: (1) environments tend to change personal characteristics to fit them, i.e., socialization, and, (2) individuals tend to select themselves into environments that are consistent with their personal characteristics (p. 45).

This collusion permits integrative complexity to develop but in certain limited ways. Only certain adaptive modes are accentuated by this collusive transaction between the person and the environment. The transactions between the person and the environment become so powerfully reinforcing, one of the other, that the next step in increasing integrative complexity is made difficult. It only comes about if and when the non-dominant adaptive modes begin to be expressed and developed. Kolb and Fry note that:

> For the reflective person the awakening of the active mode brings a new sense of risk to his life. . . .For the person who has specialized in the active mode the emergence of his reflective side broadens his range of choice and deepens his ability to sense implications for his actions. For the specialist in the concrete mode the abstract perspective gives new continuity and direction to his experience. The abstract specialist with his new sense of immediate experience finds new life and meaning in his constructions of reality (p. 50).

Increasing complexity is achieved beyond specialization only as the person begins to integrate all of the adaptive modes, each of which increases in

FIGURE 4-20

ADAPTATION MODEL:
CONTRIBUTING DEVELOPMENT MODELS

Contributors	←— Developmental Continuum —→						
	Enactive Adaptation			Reactive Adaptation			Proactive Adaptation
Kolb and Fry (experience)	Acquisition			Specialization			Integration
Loevinger (ego development)	Impulsive	Self-Protective	Conformist	Conscientious	Individualistic	Autonomous	Integrated
Jung (dimension)		No "Problems"		Persona			Individuation
Rogers (feelings)	Rigidity	Disowned feelings	Self Concept without control	Aware of Personal Constructs which are not validated	Self-Discovery	Self-Acceptance and Integration of differences	Choices of conduct become real as experience is available to the person.
Maslow (needs)				Deficiency Needs			Growth Needs
	Physiological		Security	Love, Belonging, Identification	Respect, Self-esteem		Growth and Self-Actualization
Perry (intellect)	Dualism		Multiplicity		Relativity		Commitment
Torbert (feedback)			Goal-Directed Feedback		Learning		Consciousness

complexity as the processes of each are interwoven with the others. The transactions between the person and the environment take on a different quality. Integration is achieved only as the adaptive modes are viewed in a more relativistic way. The complexity possible in each adaptive mode is increased only as the other adaptive modes, expecially the dialectically related modes, are brought into proximity of each other. As Kolb and Fry suggest, the richness of one adaptive mode is made even richer by the activation of the other adaptive modes. In the integrative state the transactions between the person and the environment are characterized by a continuing dialectic, the result of which is an increasing complexity in the internal structures of the person and an increasing complexity in the environment accessible to the person.

The Development Process--Hierarchical or Sequential. Before proceeding further with a discussion of other developmental models we need to specify our particular approach to development. The Kolb and Fry model of development specifies an hierarchical approach to development, i.e., movement toward increasingly integrative complexity. Another approach to development suggests that development is a sequence of development tasks each appropriate to certain times in a person's life, or at least the tasks follow a certain order. Erikson (1950), Levinson (1978) and Sheehy (1974) present this sequential view, stating that the normative view of hierarchical development does not give emphasis to each life task as a developmental opportunity. However, in this inquiry the hierarchical view is held without disparaging the lower levels of development. We, too, emphasize the value of each level of development. Each level contributes to an increasingly integrative complexity, an increasingly powerful adaptation between the person and the environment. The hierarchical view helps us focus our attention on processes which contribute to increases in integrative complexity. It also permits us to empirically test certain processes which might contribute to these increases.

Loevinger--Adaptation Through Ego Development. A major contributor to our thinking is Loevinger (1976) who has brought together a wide range of developmental theories and formulated a developmental model focusing on ego development. She views development as consisting of "the acquisition or change of the basic rules governing the relations among the elements" (p. 33). Thus, increasingly complex structures characterize increases in ego development. Her ten stages of ego development focus on four qualities of personal development: (1) impulse control and character development, (2) interpersonal style, (3) conscious preoccupations, and (4) cognitive style. The presentation of the stages of development appears to focus on the internal structures of the person. However, she does not limit development to this perspective. Her attention to a person's internal structures is due to an interest in measuring the extent and kind of structures which are present. She measures the complexity of developmental structures through verbal manifestations of a person's ego structure. But this methodological issue must not obscure her view of devleopment as a transactive, adaptive process.

> Because organisms are dependent on environments and open to them, and because environments can change, organisms need to adjust and accommodate, to substitute a new response for a once successful one (p. 34).

Within this context she views development not as a representation of this interaction in a person's internal ego structure but as "the adoption of the dialectic itself" (p. 421) between the environment and the person. In characterizing ego development at the higher levels of "autonomous" and "integrated" (p. 23-26) she portrays a person at these levels as a participant in the dialectics between the person and the environment.

> A distinctive mark of the Autonomous Stage is the capacity to acknowledge and to cope with inner conflict, that is, conflicting needs, conflicting duties, and the conflict between needs and desires. Probably the Autonomous person does not have more conflict than others; rather he has the courage. . . to acknowledge and deal with conflict rather than ignoring it or projecting it onto the environment (p. 23).

Although she is talking here about inner conflicts as indicators of ego development, the focus is on the person engaging fully in the person-environment dialectic as indicated by the shifts in the internal structures of the person; what we mean here as integrative complexity. Her discussion of the integrated stage further points to integration of these conflicts by accepting the, renouncing unattainable resolutions and cherishing one's own individuality as an expression of the dialectic process. Loevinger's view of adaptation focuses on this dialectic process while her measurement of increases in adaptation focuses on ego development as an indicator of stages of development.

Jung--Toward Individuation. Jung views development, first, as a continuous process of adaptation with a stream of new and recurring issues that call for attention and attempts at resolution. He then draws a picture of a developmental sequence with an analogy.

> . . . a sun that is endowed with human feeling and man's limited consciousness. In the morning it rises from the nocturnal sea of unconsciousness and looks upon the wide, bright world which lies before it in an expanse that steadily widens the higher it climbs in the firmament. In this extension of its field of action caused by its own rising, the sun will discover its significance; it will see the attainment of the greatest possible height, and the widest possible dissemination of its blessings, as its goal. In this conviction the sun pursues its course to the unforeseen zenith--the culminating point could not be calculated in advance. At the stroke of noon the descent begins. And the descent means the reversal of all the ideals and values that were

> cherished in the morning. The sun falls into contradiction with itself. It is as though it should draw in its rays instead of emitting them. Light and warmth decline and are at last extinguished (Jung, 1933, p. 15).

The central feature of this developmental view for our purposes is the shift at the "zenith" of a person's life. He speaks of consciousness in a special way concerning adults at this point in their lives. He notes a struggle that each person must engage in to become conscious of his shadow side, those non-dominant orientations which seek expression.

> The shadow is a moral problem that challenges the whole ego-personality, for no one can become conscious of the shadow without considerable moral effort. To become conscious of it involves recognizing the dark aspects of the personality as present and real. This act is the essential condition for any kind of self knowledge, and it therefore, as a rule, meets with considerable resistance (p. 145).

The recognition of the shadow is the precondition for a person to achieve the goal identified by Jung as individuation, which he defines as "the better and more complete fulfillment of the collective qualities of the human being" (p. 122). These collective qualities include, for Jung, the polar dimensions of extraversion and introversion within which are found the polar dimensions of sensing and intuiting and of thinking and feeling. Individuation represents the development of each of the qualities by the person. His model of development portrays a person accentuating one dimension from each of these polarities through the socialization process. The transition at a person's mid-life can result in the accentuating of the other dimensions from the shadow side of his personality. Only as the shadow side becomes recognized and used by the person does he free himself from the societally defined roles and become individuated. Jung admits that the person will lose his adaptive abilities in terms of meeting the demands of society, but he suggests that the higher goal is becoming one's own self. To become one's own self signifies a higher adaptation in which the person recognizes the shifts in his life and adapts to them. Thus, he can cope with the increasing complexities of life, not be holding on to a once successful strategy, but by yielding to new levels of adaptation that incorporate the shadow side of the person as well as the brightly lit side. A person continues to develop as he develops increasing integration of the two sides of his personality with the attendant complexity.

Rogers--From Rigidity to Fluidity. Rogers (1961) presents a developmental model that focuses on the process of psychological change. Although his model does not deal directly with adaptation as a person-environment transaction, it does provide valuable insights for our inquiry. He portrays a continuum from rigidity, a remoteness from and lack of awareness of feelings and problems, to fluidity, a closeness to feelings and problems and an immediate awareness of them. At the first stage the internal constructs of a person are rigid and fixed. The second stage is characterized by a disowning of one's own feelings, which yields to a third stage characterized by increased self-conceptualization in the form of a recognition that one cannot always enforce his personal choices for conduct on himself. At this stage personal constructs are recognized as constructs rather than external facts. At the fourth stage a person recognizes his personal constructs but questions their validity, while the fifth stage is characterized by an interest in self-discovery and an immediacy of experience that is sometimes surprising and unsettling. The sixth stage represents an acceptance of what a person discovers about himself. Differences are integrated as old constructs fade away. The seventh stage is an extension of the sixth stage as the choices of conduct become real and effective because the elements of experience are available to each person. As this model unfolds it becomes apparent that a person moves from rigidity and a lack of transaction with the environment to an internal fluidity that permits a person to engage in the person-environment dialectic with immediacy and choicefulness. He talks of this fluidity as an integrative state in which a person displays a basic trust in his own process, and a freedom to choose how one will be new as his life unfolds. Rogers captures for us a critical elements of adaptation, that of increasing fluidity, which leads to a view of life as process. This is adaptive for the person in that it permits increasing complexity as one's experience becomes more accepted and amenable to adaptive responses. Persons can adapt better to the world if they can accept their experiences as real and make choices within this context of reality that are congruent with the internal structures of the person, which by their interaction with the environment through reality experiences make possible the emergence of more fulfilling transactions between the person and the environment.

Maslow--From Deficiency to Growth Needs. Another developmental model from which we draw is the work on motivation by Maslow (1962). His focus, like Rogers, is on the internal structures of the person. Although Maslow prefers to think of the different needs as present in a person at all times, they represent a hierarchy of needs in which physiological needs are the first level of need, the need for security is the second level, the third level of need is for love, belonging and identification, and the fourth level is a need for respect and self-esteem. These four levels of need are deficiency needs which are of primary potency when they are not satisfied. His fifth need level is of a different nature, i.e., it is primarily potent when the lower needs have been met. This level is that of growth and self-actualization. He describes this state of development in this way:

> . . . experiencing without self-awareness, . . .making the growth choice rather than the fear choice,. . .listening to the impulse voices, . . . being honest and taking responsibility, . . . [being in] the process of actualizing one's potentialities at any time, in any amount, . . . [having] peak experience [which are often] transient moments of self-actualization (1971, pp. 47-48).

Maslow's model suggests a developmental pattern in which each level of need must be satisfied before the new levels can be considered and satisfied. Growth occurs only when the other needs have been satisfied. The extent to which a person could develop increasing integrative complexity thus is limited by the extent to which these lower level needs have been met. The progression of development seems to begin with meeting the lower level physiological needs, then the more psychological and socio-psychological needs of security, safety, connectedness to other people, and self esteem, and only then on to growth needs for self-actualization. Integrative complexity begins to develop for the person, it appears, only as a person is released from the lowest levels of need, physical and security. The satisfaction of the more social-psychological needs leads to the kinds of limited complexity to which Kolb and Jung refer as being derived from the collusion of the person and the environment to the emphasis of certain adaptive modes. The higher reaches of integrative complexity are possible only as the attention to growth is focal for the person. We can, in this way, relate Maslow's motivation model to the adaptive process since a need structure can only be satisfied in the context of a person-environment transaction.

Perry--Toward Commitment Within Relativism. Perry (1970) adds to our discussion of development through increasingly integrative complexity with his model that demonstrates the process of intellectual and ethical development. The person-environment context to which his studies refer is that of college students in increasing transaction with their teachers. He noted the succession of forms through which students make sense of their experience, especially related to the questions of What is knowledge? and From where does knowledge come? He was interested in how meta-thinking develops. The positions through which the student-teacher interactions proceed begin with duality in which the student rigidly interacts with his teachers in terms that suggest that the teacher is an all-knowing authority. Progress toward meta-thinking (integrative complexity) really begins with the first step away from the duality position into multiplicity pre-legitimate. This position finds the student seeing any diversity as a tool for teachers to help him arrive at the single truth. The multiplicity subordinate position finds the student accepting some uncertainty based on the lack of progress toward the discovery of the truth. The fourth position, multiplicity correlate or relativism subordinate, represents another step in integrative complexity. The student either divides the world into the realm of absolute right and the realm of legitimate uncertainty, or sees the world more in terms of contextual and relativistic thinking. This latter view is limited to a mode of thinking, not to a generalization about the nature of the world and the student's interaction with it. Position five represents a major shift into a relativistic view of the world in which all knowledge is relativistic and contextual. The student is open to all knowledge with commitment to none of it. Increasing complexity can thrive in this context in the sense that everything is fair game. But position six permits further complexity as the student realizes that to orient himself to this relativistic world he must make a personal commitment in order to structure the world for himself. This awareness is followed by the seventh position in which the student makes an initial commitment, "an affirmation made in a world perceived as relativistic, that is, after detachment, doubt, and awareness of alternatives have made the experience of personal choice a possibility. It is an act in an examined . . . life" (p. 136). Two additional positions refer to an increasing commitment by the student out of which an established identity forms. This model adds to our thinking about increasingly integrative complexity by highlighting the process of increasing cognitive complexity from a rigid truth, through levels of multiplicity and relativity of knowledge, to an increasing commitment within a relativistic world. Increasing complexity in this view depends on development through a period of a lack of fixity, that is, relativity, before higher levels of complexity can be structured. And even at these higher levels, the structuring of complexity allows the continuing creation of more complexity in that the students, as they enter the world, can manage their relativistically understood environment from a position of personal commitment. This same perspectice is expressed by such writers as Kohlberg (1969) with his model of moral development and Harvey (1966) with his model of proactive management of the environment in order to assimilate diversity and deviance without the loss of one's purpose.

Torbert--Experience Toward Consciousness. Torbert (1972) focuses attention on learning from experience. His contribution to this inquiry into adaptation is his specification of three levels of feedback. The focus on feedback highlights the transactions between the person and the environment. The environment provides feedback to the person and the person can respond to that feedback. The first-order feedback he identifies is goal-directed. "Its function is to redirect the system as it negotiates its outer environment towards a specific goal. The goals and boundaries of the system are assumed to be defined, so feedback is also defined" (p. 14). This would be comparable to Kolb and Fry's specialization stage of development in which the person-environment collusion represents this kind of feedback. Second-order feedback, or learning, alerts "the system to changes it needs to make within its own structure to achieve its goal. The change in structure may lead to a redefinition of what the goal is and always leads to redefinition of the units of feedback" (p. 14). We can see the basis for increasing complexity in the shift from goal-directed to learning feedback. The person (system) shifts from reacting to the environment to becoming more proactive in transacting with the environment through the restructuring of his goals and controlling what parts of the environment to which he will pay attention. This increasing leverage in transacting with the environment is further enhanced by third-order feedback, the function of which is "to scan all system-environment interactions immedaitely in order to maintain a sense of the overall, lifetime, autonomous purpose and integrity of the system" (p. 14). He calls this state consciousness. Once again, we see that higher levels of integrative complexity are made possible by increasing complexity in a person's internal structures and, subsequently, an integration of these structures with the environment in a developmental transaction. This theme is buttressed by Freire (1968), who strongly suggests that integrative complexity can only be obtained when the person transacts with the environment through action and reflection both of which are required for an adequate scan of the environment.

Adaptation: Toward Integrative Complexity. The discussion to this point suggests a developmental model for adults in which the goal is increasingly integrative complexity. We can clearly identify a developmental continuum, the intermediate steps of which are not as clear. The continuum begins with adaptation that we call enactive adaptation. Piaget (Ginsburg and Opper, 1969) provides this term which is defined as describing a person who learns through feeling, touching and handling. The person is goal-directed in an accommodative way, acting without developed internal (assimilative) structures. There is a lack of transaction between the person and the environment. The person mostly makes associations through stimulus-response patterns. In one sense the enactive level is the absence of adaptation, i.e., adaptation defined as person-environment transactions. However, it does define the lower limits of the adaptation continuum and as such can be included in the adaptation scheme as a primitive form of adaptation. The other end of the continnum we called proactive adaptation. This represents the higher levels of transactions between the person and the environment. High levels of complexity are made possible by increasing relativity and the integration of adaptive modes. Integration is achieved not only in the internal structures of the person but in the transactions between the person and the environment. The dialectic between the person and the environment is increasingly integrated in a way that encourages increasing complexity for the person to experience.

Proactive adaptation has many aspects which are captured in the discussion of contributing developmental models (see Figure 4-20, also). Adaptive modes are increasingly integrated as they increase in complexity. The non-dominant modes in earlier stages of development come to the forefront and enlighten the already developed modes. The individual distinguishes his unique forms of transactions with the environment. An increasing fluidity characterizes a proactively adaptive person as the process of life permits the inclusion of conflicting ideas and interactions. This person focuses on growth and establishes a unique perspective on the world through a commitment to a personal perspective from which to transact with a relativistic world. This perspective permits an immediate scanning of the environment as transactions between the person and environment continue in order that those transactions can be most adaptive in terms of the ultimate purposes of the person as a participant in the person-environment dialectic.

The steps along the developmental continuum are variously described by the models presented above. A suggested middle range in this developmental continuum can be distinguished by reactive adaptation. Development of increasing complexity proceeds for youg adults through a process of socialization in which the person strives to achieve a socially defined role. This specialization process is characterized by an accommodation to the environment through a mutually reinforcing transaction between the person and the environment. A person in this range of development may or may not begin to shift attention to underdeveloped adaptive modes. Such a shift would indicate a preparation for a qualitative change in the integrative complexity possible for the person to entertain. The transition from one point on the continuum to the next, including the transition from a reactive to a proactive adaptation, is difficult to determine. The critical task at this point is to establish the continuum. The deliniation of the points of demarcation along the continuum goes beyond the focus of this inquiry. The attention to the middle range of reactive adaptation merely helps to note the presence of a series of steps which define the continuum.

Adaptation is a process of development, then, which is characterized by an increasing complexity and integration of the adaptive modes in the context of the person-environment transaction. This developmental process proceeds on a continuum from enactive adaptation, through reactive adaptation to a proactive adaptation.

Adaptive Flexibility--A Variable. A central process of adaptation through increasingly integrative complexity is that of flexibility. The extent to which the person flexibly engages in transaction with the environment the greater the opportunities for developing complexity in each mode and the integration of the adaptive modes. This is especially true for the integration of dialectically related adaptive modes. We suggest that one indicator of movement along the developmental continuum is adaptive flexibility. Adaptive flexibility is the tendency of a person to modify his behavior on the basis of transactions between his personal orientation, values and purposes, and changing environmental demands. This placed the individual in a position between his internal structures and the environment. From this position he can exercise his choices about transactions with the environment.*

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* To relieve a certain awkwardness of expression the phrases "person-environment transactions" and "interactions of the person and the environment" in this document are to be interpreted as transactions between the person's internal structures and the environment. The view of the individual as being on the boundary between these two sides of the adaptive transactions helps gain the perspective that a person can have better perspective on the transactions with the possible end result of the dialectic between the internal structures and the environmental demands becoming central to his adaptation processes.

Proposition I: Increased adaptive flexibility as an indicator of adult development is indicative of increasingly active adaptation.

This proposition is derived principally from the developmental model of experiential learning theory as presented by Kolb and Fry (1975). Their view stresses that development occurs as the four basic adaptive modes are seen to increase in complexity and relativity through the integration of the dialectic nature of these modes. To manage this level of integration the transactions between the person and the environment will become increasingly flexible in order to permit sufficient relativity and complexity. Perry (1970) also emphasizes an increasing relativity which creates the need for greater adaptive flexibility. Commitment within relativity would be indicated by a high degree of adaptive flexiblity since without sufficient relativity a person cannot form his own purposes, free of environmental demands. This theme is supported by Kohlberg (1969), Harvey (1966) and Schroder et al. (1967) who point to the role of an internal purpose, goal or structure in active adaptation which is derived from a sufficient level of complexity found in the context of high adaptive flexibility. Loevinger (1976) presents a most cogent picture of adult development. She notes the clear role of adaptive flexibility:

> Flexibility in the exchanges with the environment is no less an important property for survival. Because organisms are dependent on environments and open to them, and because environments can change, organisms need to adjust and accommodate, to substitute a new response for a once successful one. . . . The degree of flexibility . . . may be an indication of the organism's development (p. 34).

This is clearly a restatement of the concept of adaptive flexibility, which Loevinger proceeds to explicate through her developmental model. This adaptive flexibility is achieved by successive improvements in the cognitive and emotional structures of the person; improvements which create a more highly differentiated and complex internal structure which provides the means for more appropriate, more enriching, and more effective interaction with the environment. She, thus, confirms our concept of adaptive flexibility as an indicator of adult development in that "improvements" in the internal structures place persons in a position of greater flexibility in managing the transactions between themselves and the environment. Further, she links this flexibility to the concept of adult development; the steps a person can take in developing an internal structure which is increasingly complex and adaptive.

Proposition II: When a person is in a position of low psychological safety, i.e., experiencing stress, conflict and a high degree of transition, adaptive flexiblity will be reduced.

The concept of psychological safety is drawn from the work of Abraham Maslow (1954, 1962, 1971). As we noted earlier his theory of motivation represents a model of development through a series of physical, psychological and social-psychological need satisfactions to a satisfaction of a need for growth and self-actualization. His view tht the first four levels of needs are deficiency motivators, i.e., people are motivated by the lack of need satisfaction, suggests that movement toward increasingly integrative complexity can be undercut by a resurgency of needs for psychological safety. This level of need is next to the first level of need, the physical. As such, the satisfaction of psychological safety needs must preceed consideration of higher level needs including growth needs. Progress toward proactive adaptation would be halted or appreciably reduced by the presence of psychological safety needs. The impact of the presence of this need would be felt in the adaptive flexibility of a person. A person experiencing stress, conflict or a high degree of transition would be susceptible to threats to his psychological safety. The need for increased psychological safety would reduce the flexibility with which a person would engage his adaptive modes, the result being lessened opportunity for increasing the complexity in those modes and interactions among the modes.

Proposition III: When a person experiences a high degree of self-direction or a strong sense of identity, the person will exhibit higher degrees of adaptive flexibility.

Maslow's (1954) concept of self-actualization focuses on the person taking charge of his growth processes. With the satisfaction of the deficiency needs, a person feels the need for growth the expresses this need through efforts toward actualizing his unique potential. In this state the person can extend himself by flexibly engaging the transactions of the person-environment dialectic. Adaptive flexibility thus is associated with a high degree of self-direction.

The theme of self-direction is further explored by Robert White (1959) who suggests a similar idea of a motivation beyond satisfaction. He suggests the notion of effectance motivation; the desire of a person to accomplish something, not just to exist. The desire to be effective, to be competent, is shown by White to be a key motivational element in people which gets expressed most fully at levels of development where a person has an internal sense of direction. Effectance motivation suggests a need to flexibly engage the environment beyond survival needs. This motivational construct indicates an association between adaptive flexiblity and self-direction, i.e., increases in adaptive flexibility will be associated with increases in effectance motivation.

Identity formation is associated with the development of integrative complexity as indicated by Jung (1970) in his discussion of the process of individuation. He noted that the person approaches individuation when he takes into account his shadow side, the non-dominant dimensions of his personality, and forms his unique self separated from the societally defined role (persona). Only through this sometimes painful shift does a person begin to discover and engage all of the dimensions of his personality in an adaptation which is congruent between the internal structures of the person and the environmental demands. In order to make this difficult shift a person must flexibly accept the presence of the non-dominant modes; further he must flexibly engage these modes to bring out the complexity of his personality and be in a position to transact with the environment in terms appropriate to his unfolding personality structures. Adaptive flexibility is, therefore, associated with the development of a strong sense of identity.

Proposition IV: An increase in cognitive development, in terms of increased complexity, is accompanied by an increase in adaptive flexibility.

The development of adults toward proactive adaptation has been defined as increases in integrative complexity. A key to obtaining this complexity is cognitive development. Perry (1970) has noted the path toward cognitive complexity. An intellectual rigidity (dualism) yields to an increasing awareness of the multiplicity of the world and one's experience within it. When this multiplicity is understood as representing a relativistic transaction between the person and his environment he gains sufficient flexibility to establish an independent perspective on his transactions with the world. From this perspective the amount of complexity he can entertain can expand. Central to this developmental model is the creation of a perspective of relativity and contextualism. The achievement of this perspective is accompanied by the presence of adaptive flexibility.

Loevinger (1976), also, emphasizes the functions of cognitive style in the developmental process. She notes the increasing conceptual complexity in the forms of more complex patterning, the distinction of process from outcomes, the toleration of ambiguity and the breadth of scope a person can obtain. Associated with all of these forms of complexity is an adaptive flexibility in that (a) the creation of recognition of more compelx patterns is possible when the person is open to considering a range of possible patterns, (b) separating process from outcomes demonstrates a willingness to entertain a novel view of the world, (c) ambiguity can be tolerated when a person is free to consider the presence of undefined elements, and (d) the range of possibilities a person will consider is a function of an openness to variety.

Proposition V: The extent of flexibility expressed in a person's relationships with others is associated with the extent of adaptive flexibility a person demonstrates.

The movement of a person toward proactive adaptation involves an increasing flexibility which Rogers (1961) presents as an increasing proces orientation.

> Life, at its best, is a flowing, changing process in which nothing is fixed. . . . I find that when life is richest and most rewarding it is a flowing process. . . . I find I am at my best when I can let the flow of my experience carry me in a direction which appears to be forward, toward goals of which I am but dimly aware. In thus floating with the complex stream of my experiencing, and in trying to understand its ever-changing complexity, it should be evident that there are no fixed points. When I am thus able to be in process, it is clear that there can be no closed system of beliefs, no unchanging set of principles which I hold. life is guided by a changing understanding of and interpretation of my experience. It is always in process of becoming (p. 27).

What Rogers is suggesting is that one's internal structure is mirrored in how one structures his life space, and that viewing that reflection in terms of a process in which the internal structure continually shifts as experience in the world unfolds will yield greater complexity and richness. The extent to which a person lives his life as a process, with the attendand flexibility and variability in his life space and his internal constructs, he will create an increasingly active adaptation to life. Rogers expands this notion to the arena of interpersonal relationships. His general law of interpersonal relationships states:

> The greater the congruence of experience, awareness and communication on the part of one individual, the more the ensuing relationship will involve: a tendency toward reciprocal communication with a quality of increasing congruence; a tendency toward more mutually accurate understanding of the communications; improved psychological adjustment and functioning in both parties, mutual satisfaction in the relationship.

This concept of congruence captures not only the essence of adaptive relationships but of the integration of one's internal structure with one's life space, or environment. It is appraent that for congruity in relationships to occur, a person must be involved in a life process that supports the continuing creation of congruence between the person and his environment. That life process can lead to increased congruence within the interaction between a person and his environment and within the specialized part of that interaction which we have been referring to as interpersonal relationships. Adaptive flexibility seems, then, to be associated with the development of congruence. Increasing congruence can be seen as moving toward proactive adaptation in that it contributes to a person's ability to be choiceful about his interactions with the environment and to act upon that environment in ways that optimize his adaptation to it.

Goffman (1959) brings a related perspective to the interaction of a person's internal structure to his environment. In an attempt to bring together three areas of inquiry--individual personality, social interaction and society--he states that:

> When an individual appears before others, he knowingly and unwittingly projects a definition of the situation, of which a conception of himself is an important part. When an event occurs which is expressively incompatible with this fostered impression, significant consequences are simultaneously felt in three levels of social reality. . . personality, interaction, and social structure (pp. 242-243).

By focusing on a person's presentation of self, and the possibilities of error in one's daily attempts, he highlights the interaction between a person's internal structure and how that gets played out in the person's social environment. This focus on possible failures of adaptation points to the need for a person to work toward an integration of his internal structure and his presentation of himself in the world. Through a more genuine, or congruent, presentation of self the person can move toward a more proactive adaptation. He can present himself congruently in terms of what he is internally and congruently with the social context in which he finds himself.

Two other sociologists, Berger and Luckmann (1966), point to the interaction of a person's internal construction of reality and the social, "objective" reality. They note that:

> Man is biologically predestined to construct and to inhabit a world with others. This world becomes for him the dominant and definitive reality. Its limits are set by nature, but once constructed, this world acts back upon nature. In the dialectic between nature and the socially constructed world the human organism itself is transformed. In this same dialectic man produces reality and thereby produces himself (p. 183).

This view rather neatly expresses how people become defined through what Berger and Luckmann call primary socialization, i.e., socially determined basic assumptions. Secondary socialization, in which people develop role definitions, begins the dialectic process between social man and nature.

Integration occurs when this dialectic continues as people begin to produce their own reality. These authors confirm the notion of proactive adaptation by recognizing that the continuing interaction between people and society creates an adaptive flexibility which permits the person-environment dialectic to continue to the point where people can begin to create the social reality and, as a result, their own identity.

Summary. So far we have developed a concept of adaptation beginning with experiential learning theory. Adaptation was defined as a continous transaction between a person and the environment which can contribute to increasingly integrative complexity. The means of operationalizing the concept of adaptation was introduced as the Adaptive Style Inventory instrument. The implications of this instrument as a measure of states of adaptation were explored. Then the developmental models which add to our thinking about adaptation as a developmental process for adults were presented in preparation for the development of the process variable adaptive flexibility. Five propositions were then presented by which adaptive flexibility can be considered further in this inquiry.

Data Collection. Three sub-samples from the grand sample described in Section IV-D were used for the analysis of adaptive flexibility. The two NIE samples (engineers and social workers) and the Spencer sample (mid-life adults) constitute the combined sample. It is used, as a whole or in parts, for the descriptive statistics and construct validation of the adaptive flexibility variable. Table 4-13 presents the relevant demographics for the combined sample. Table 4-14 presents the variety of occupations represented within the mid-life adults sample. These groups are basically similar, the exceptions being that the engineers are all male, the mid-life adults include many more divorced people and represent a wide range of professions. The manner of data collection for the combined samples was the same for all instrumentation, i.e., individually administered.

Qualitative Portrayal of Adaptive Flexibility Variable. Responses to the ASI can be portrayed in a way that shows one's adaptive orientation as a single point on a two dimensional learning space in the grid. This point represents modal responses without reference to any particular situation. It is achieved by noting their score on the abstract-concrete dimension (AC-CE) and their score on the active-reflective dimension (AE-RO) and plotting a point at the juncture of these two points on the grid (see Figure 4-21). The same procedure was followed to portray how the person responded in each of the four kinds of situations. Arrows were then drawn from the total score to each of the situational scores. These arrows indicated the direction of the person's general response to each kind of situation. In Figure 4-21 two individual's responses are recorded to demonstrate geometrically how such portrayal could vary. Respondent A has a total score near the center of the grid indicating a relative balance between the person's response in terms of the four adaptation modes. The responses to each environmental press are consonant with the press in three of the four instances. The modal response to the diverger situation is heavily active and does not differ significantly from the total score on the abstract-concrete dimension. It could be said that this person responded to three situational presses--accommodator, converger, assimilator--in terms consonant with those presses. However, in diverger situations the respondent responded primarily in an active mode.

TABLE 4-13

COMBINED SAMPLE DEMOGRAPHICS

	Mid-Life++ Adults	Engineers	Social Workers
Male	20	44	6
Female	19	0	16
Age			
24-29	0	12	6
30-35	2	12	4
36-40	13	11	2
41-45	11	8	4
46-55	10+	2	6
Marital Status			
Single	5	4	6
Married	21	40	15
Divorced	13	0	1
Race			
Afro-American	0	0	3
Caucasian	39	43	19
Oriental	0	1	0

+ two persons did not provide their age
++ see Table 3 for occupations for Mid-Life Adults

TABLE 4-14

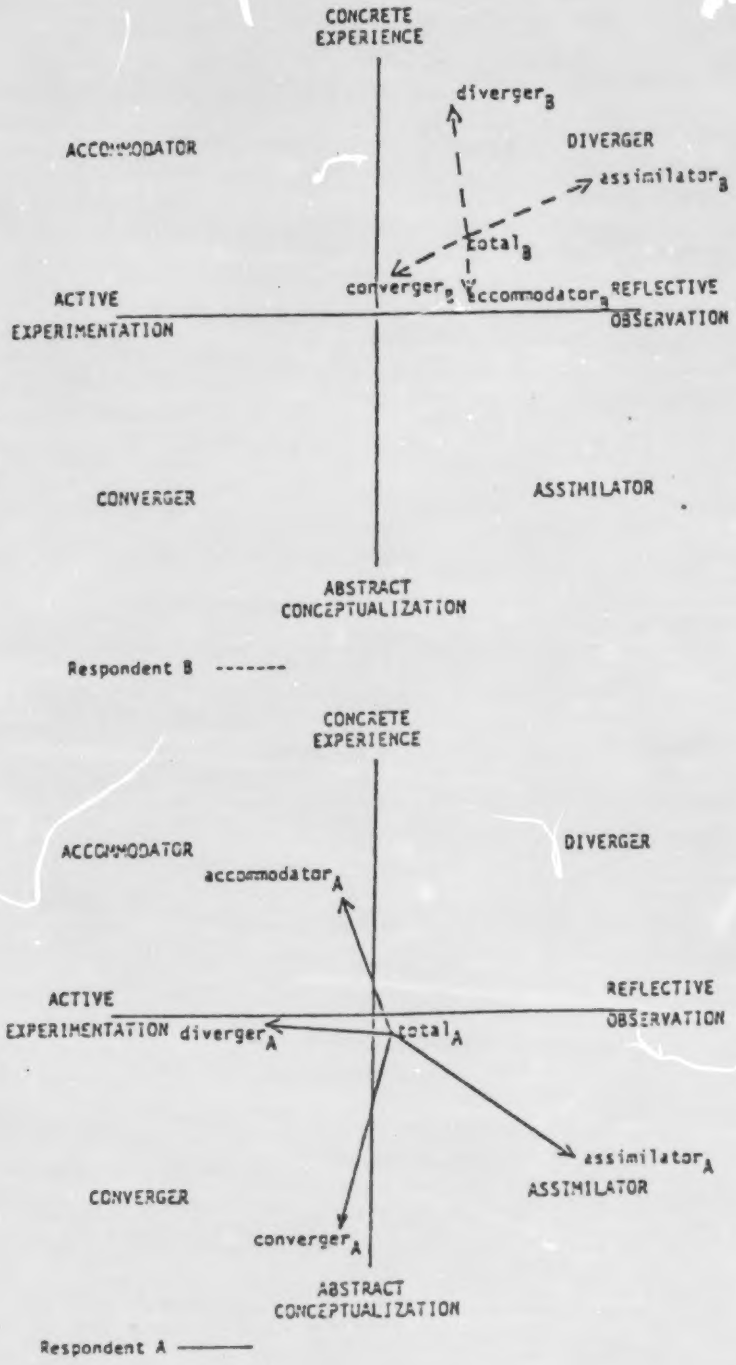
OCCUPATIONS OF MID-LIFE ADULTS

College Professor
High School Teacher
Teacher (2)
Organization Development Consultant/Engineer
Organization Development/Economist
Internal Organization Development Consultant
Metallurgist/Organization Development Consultant
Engineer (4)
Publisher/Engineer
Politician/Teacher
Osteopath
Bookkeeper
Nurse/Nun
Manager (3)
Office Manager/Researcher
Owner/Manager
Insurance Manager
Management Consultant
Account Executive
Financial Vice President
Career Placement/President
Administrative Assistant
Housewife/Advertising Manager
PhD Student
Psychologist/Student
Radio/TV Programmer
Advocate/Planner
Secretary (2)
Biochemist/Computers
Nurse
Social Worker

Note: One respondent was unemployed.

FIGURE 4-21

Geometric Adaptive Flexibility Score on the Adaptive Style Inventory


CONCRETE EXPERIENCE
diverger$_B$
ACCOMMODATOR
DIVERGER
assimilator$_B$
total$_B$
ACTIVE EXPERIMENTATION
converger$_B$
accommodator$_B$
REFLECTIVE OBSERVATION
CONVERGER
ASSIMILATOR
ABSTRACT CONCEPTUALIZATION
Respondent B -------
CONCRETE EXPERIENCE
ACCOMMODATOR
accommodator$_A$
DIVERGER
ACTIVE EXPERIMENTATION
diverger$_A$
total$_A$
REFLECTIVE OBSERVATION
assimilator$_A$
CONVERGER
ASSIMILATOR
converger$_A$
ABSTRACT CONCEPTUALIZATION
Respondent A ———

Respondent B, on the other hand, has a total score well within the DIVERGER quadrant indicating a strong tendency to respond to all situations in a concrete and reflective mode, i.e., divergent. Each of the situational presses were responded to in terms other than the press of the environment (relative to the total score), except in CONVERGER situations. In DIVERGER situations this person responds in very concrete ways but also responds in slightly more active ways than his overall response (indicated by the total B score). The response to diverger situations would be interpreted as more appropriate to accommodator situations. (Admittedly, the response in terms of the total grid is still in the DIVERGER quadrant which makes the response still consonant with the situational press. However, the reference point for each person is not the theoretical center of the grid, but their own total score.) In accommodator situations the person responds in a more abstract way and in a somewhat reflective way, contrary to the accommodator situational press which demands a concrete and active response. In assimilator situations respondent B responded in a reflective way as would be demanded by the situation, but also responded in a concrete way which is contrary to the assimilator situational press. Finally, this respondent responded to converger situations in ways appropriate to the converger situational press.

When we have debriefed respondents about their response patterns the portrayal has been accurate from their viewpoint. They have been able to cite specific situations in which they respond in ways portrayed on the ASI graph.

Quantitative Measurement of Adaptive Flexibility Variables. While the qualitative portrayal of a person's adaptive flexibility was found to be relatively accurate, we wanted a quantitative way to portray adaptive flexibility in order to submit the data to statistical analysis. A number of schemes were conceptualized. Out of these options the most direct, clear indicator of adaptive flexiblity was the extent to which respondents vary their modal responses in different situations. The attempt to determine the direction of this variability created a number of problems. It soon became clear that directionality of variability involved a number of other variables which could not be separated out given the current data base. This is consistent with our theory statement in which we noted that the question of how adaptive flexibility occurs is a function of some other variable such as personal goals or environmental constraints. Thus, it was concluded that for the purposes of this inquiry it would be assumed that within adaptive flexibility the aspect of variability is an adequate indicator and that the search for additional directional aspects should be left for subsequent research.

Operationally, the definition of adaptive flexibility for this inquiry was determined to be the differences of the situational responses from the general response to all situations within each adaptive mode and dimension.

Formulae were devised to express these relationships:

$$AF_{ce}^{cn} = ABS\ (T_{ce}/4 - t_{ce}^{cn})$$

- where "AF" is Adaptive Flexibility
- where "cn" is converger situations
- where "ce" is concrete experience adaptive responses
- where "ABS" is the absolute difference
- where "T" is the total modal score
- where "t" is the total modal score within a situation
- where the number 4 divides the total modal score to be comparable to the total modal score within each situation

$$AF_{ce}^{as} = ABS\ (T_{ce}/4 - t_{ce}^{as})$$

- where "as" is assimilator situations

$$AF_{ce}^{dv} = ABS\ (T_{ce}/4 - t_{ce}^{dv})$$

- where "dv" is diverger situations

$$AF_{ce}^{ac} = ABS\ (T_{ce}/4 - t_{ce}^{ac})$$

- where "ac" is accommodator situations

This set of formulae expresses the difference between the total score of a respondent in terms of concrete experience modal responses and the sub-scores for the same mode within each separate kind of situation. Similar sets of formulae were created for the remaining four adaptive modes.

A total Adaptive Flexibility score for each adaptive mode was then created, as noted here for the concrete experience adaptive mode:

$$AF_{ce}^{t} = AF_{ce}^{cn} + AF_{ce}^{as} + AF_{ce}^{dv} + AF_{ce}^{ac}$$

- where "t" is the total modal score.

Identical adaptive flexibility scores were derived for:

AF^t_{ro}, AF^t_{ac}, AF^t_{ae}.

for the relfective observation, abstract conceptualization, and active experimentation adaptive modes. And finanly, a grand total score was conceived which combined all of the totals for the modal adaptive flexibility scores.

$$AF_{gt} = AF^t_{ce} + AF^t_{ro} + AF^t_{ac} + AF^t_{ae}$$

• where "gt" is the grand total score

However, for purposes of simplicity the five adaptive flexibility scores will be labeled as follows:

AF^t_{ce} will be AF_{ce}

AF^t_{ro} will be AF_{ro}

AF^t_{ac} will be AF_{ac}

AF^t_{ae} will be AF_{ae}

AF_{gt} will be AF_t

These scores represent the variable of adaptive flexibility in the subsequent analysis.

Intercorrelation of Adaptive Flexibility Scores. Adaptive flexibility in each adaptive mode would be expected to be relatively independent of adaptive flexibility in the other three adaptive modes. If any relationship exists among the different adaptive flexibility scores it would be that the distribution of adaptive flexibility would be shared rather equally among all four adaptive modes. Table 4-15 reports the relationships among the adaptive flexibility scores. We see that the total adaptive flexibility score relates at the .5+ correlation with every modal score, which suggests an even distrubition of adaptive flexibility among the modes. In addition, we note that adaptive flexibility on each dimension--abstract-concrete and active-reflective--is positively related, i.e., abstract adaptive flexibility relates positively to concrete adaptive flexibility and active adaptive flexibility relates positively to reflective adaptive flexibility. This suggests that as a person is flexible in one adaptive mode they tend to be adaptively flexible in the dialectically related adaptive mode. Finally, we note that adaptive flexibility in a mode from one dimension does not relate to adaptive flexibility in a mode from another dimension, i.e., adaptive flexibility in the abstract-concrete dimension does not relate to adaptive flexibility in the behavioral-perceptual dimension.

This analysis suggests that the variables of adaptive flexibility are clearly distinct variables and are confirming of the orthogonal relationship of the adaptive dimensions.

Distribution of Adaptive Flexibility. As indicated in the previous discussion of the relationships among the adaptive flexibility scores, we would expect a relatively even distribution of adaptive flexibility among the four adaptive modes. This should be borne out across samples. Table 4-16 indicates this to be the case. In the combined sample the four modal scores of adaptive flexibility are closely aligned; within .3 points of each other. In examining the three samples that make up the combined sample we note that mid-life adults are somewhat more flexible in each mode and as a result in total flexibility. The grand sample (see Section VI-D) also shows the expected relatively even distrubition of flexibility across the four adaptive modes.

Relationship of Adaptive Flexibility to Adaptive and Learning Modes. Adaptive flexibility is a derivative of the developmental dimension of the experiential learning theory. It portends to measure the extent to which a person flexibly modifies his behavior as a function of the interaction between his internal structures and the environment. As such the Adaptive Style Inventory and the Learning Style Inventory would not serve as criteria for validating this variable since they measure the extent of the use of preference for each adaptive/learning mode. In general we would predict no relationship between learning style and adaptive flexibility, however, the scores on these instruments, were compared to observe what relationships might exist.

Table 4-17 reports the relationship between adaptive flexibility and scores on the Adaptive Style Inventory. We discover that total adaptive flexibility relates positively to concrete experience and active experimentation. Adaptive flexibility in the adaptive modes of concrete experience and abstract conceptualization contribute most to the positive relationship

TABLE 4-15

INTERCORRELATION OF ADAPTIVE FLEXIBILITY SCORES

Grand Sample (N = 626)

	CE FLEX	RO FLEX	AC FLEX	AE FLEX	TOT FLEX
CE FLEX	1.000***	.018	.223***	.075	.575***
RO FLEX		1.000***	.031	.186*	.544***
AC FLEX			1.000***	.036	.557***
AE FLEX				1.000***	.591***
TOT FLEX					1.000***

*** significance less than .001 one-tail test

Where:
CE = concrete experience adaptive mode
RO = reflective observation adaptive mode
AC = abstract conceptualization adaptive mode
AE = active experimentation adaptive mode
TOT = total of combined adaptive modes
FLEX = adaptive flexibility

TABLE 4-16

DISTRIBUTION OF ADAPTIVE FLEXIBILITY
BY GRAND, COMBINED AND SUBSAMPLES

Means ($\bar{X}$) and Standard Deviations (SD)

Adaptive Flexibility (AF) Variables	Combined Sample		Sub-Samples						Grand Sample	
			Mid-Life Adults		Engineers		Social Workers			
	N = 109		N = 39		N = 47		N = 23		N = 626	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
AF_{ce}	4.1	1.7	4.6	2.1	3.8	1.5	4.0	1.3	3.8	1.6
AF_{ro}	4.1	1.7	4.2	1.8	4.0	1.6	3.5	1.4	4.0	1.6
AF_{ac}	3.9	1.7	4.4	1.8	3.6	1.8	3.6	1.5	3.7	1.6
AF_{ae}	4.2	1.7	4.4	1.5	4.2	2.0	4.1	1.4	4.3	1.7
AF_{t}	15.9	4.3	17.3	4.9	15.3	4.0	14.9	2.9	15.8	3.6

TABLE 4-17

CORRELATIONS WITH ADAPTIVE FLEXIBILITY WITH ADAPTIVE STYLE INVENTORY TOTAL SCORES

Grand Sample (N = 626)

	TOTAL CE	TOTAL RO	TOTAL AC	TOTAL AE	TOTAL AC-CE	TOTAL AE-RO
Adaptive Flexibility concrete experience	.30**	-.14**	-.23**	-.01	-.29**	.08
Adaptive Flexibility reflective observation	.07	-.07	-.11*	.11*	-.10*	.11*
Adaptive Flexibility abstract conceptualization	.18**	.01	-.24**	.05	-.23**	.03
Adaptive Flexibility active experimentation	-.06	-.01	-.06	.17**	.00	.10*
Adaptive Flexibility total	.22**	-.09*	-.28**	.14**	-.26**	.14**

* significance less than .05
** significance less than .01

two-tailed test

Where:
CE = concrete experience adaptive mode
RO = reflective observation adaptive mode
AC = abstract conceptualization adaptive mode
AE = active experimentation adaptive mode
AC-CE = difference between AC and CE
AE-RO = difference between AE and RO

with total concrete experience on the ASI, while adaptive flexibility in the adaptive modes of reflective observation and active experimentation contribute most to the positive relationship of adaptive flexibility with total active experimentation on the ASI.

We also discover that adaptive flexibility relates negatively to total reflective observation and abstract conceptualization on the ASI, with adaptive flexibility in the adaptive modes of concrete experience and abstract conceptualization contributing most to this relationship.

These relationships do not present a clear picture. We do note that adaptive flexibility seems to relate best to adaptive modes that combine to form the adaptive style of accommodation. This would fit with the definition of adaptive flexibility that focuses on the interaction between the person and the environment. However, the relationships are not strong enough to indicate that adaptive flexibility is limited to these adaptive modes. The lack of strong relationships between adaptive flexibility and acores on the Learning Style Inventory supports this conclusion. Table 4-18 shows no relationship between adaptive flexibility and the scores on the LSI.

Validity of the Adaptive Flexibility Measure. Validation of the adaptive flexibility measure was conducted by empirically testing the five propositions stated earlier.

Proposition I: Increased adaptive flexibility as an indicator of adult development is indicative of increasingly proactive adaptation.

The concept of adult development has been operationally defined by Loevinger (1976) in terms of ego development levels. Her sentence completion instrument was used as an operationalization of these levels. This test is a projective test consisting of thirty-six sentence stems that the respondent is asked to complete. The interpretation, coding and scoring of the responses follow the instructions included in the test manual (Loevinger, 1970).* The distribution of ego development level is reported in Figure 4-22 for the combined sample.**

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* The number of respondents at the Conformist level (7) and at the Autonomous level (1) were grouped with the respondents in adjacent groups to prevent misleading conclusions on the basis of this portrayal.

** The scores on the sentnece completion test were obtained by two trained interpreters with an inter-rater reliability of 80% agreement on ego level scores (all disagreements were within one level).

TABLE 4-18

CORRELATIONS OF ADAPTIVE FLEXIBILITY WITH LEARNING STYLE INVENTORY SCORES

Grand Sample (N = 626)

	LSI CE	LSI RO	LSI AC	LSI AE	LSI AC-CE	LSI AE-RO
Adaptive Flexibility concrete experience	.07	-.01	-.01	-.03	-.04	-.01
Adaptive Flexibility reflective observation	.01	-.06	-.04	.09	-.03	.08
Adaptive Flexibility abstract conceptualization	.10	-.07	-.11	.10	-.12	.09
Adaptive Flexibility active experimentation	.01	-.05	-.05	.07	-.04	.07
Adaptive Flexibility total	.08	-.09	-.09	.10	-.10	.10

* significance less than .05 two-tailed test

Where:
CE = concrete experience learning mode
RO = reflective observation learning mode
AC = abstract conceptualization learning mode
AE = active experimentation learning mode
ACCE = difference between AC and CE
AERO = difference between AE and RO

Using the Loevinger measure as our indicator of adult development it is hypothesized that people scoring higher in ego development would also demonstrate a higher degree of adaptive flexibility; the higher levels of ego development being representative of increasingly proactive adaptation. Our analysis of the relationship between adaptive flexibility and ego development level (Figure 4-22) indicates a definite relationship as predicted. Total flexibility across the four adaptive modes is strongly related to ego development (r=26, p=.003). Thus, we can say that as people increase their adaptive flexibility they are increasing in development of proactive adaptation as indicated by higher levels of ego development.

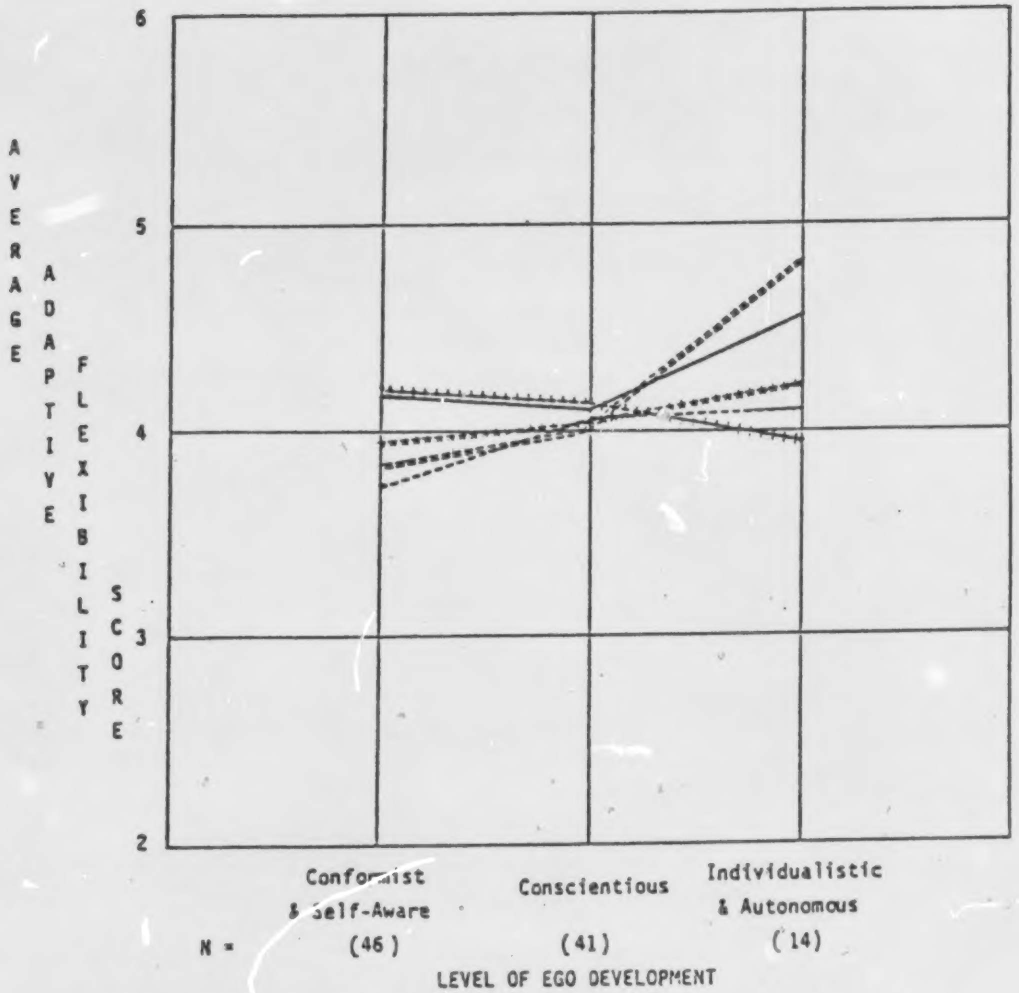
We note that as ego development level increases adaptive flexibility increases in all adaptive modes. Thus as a person reaches higher levels of development he is in a position to actively enter into the dialectic between his internal structures and the environment. We see that at the lower levels there is less flexibility in the modes of concrete experience, reflective observation and especially abstract conceptualization. Only the adaptive mode of active experimentation shows flexibility at this lower level of ego development. This confirms our hypothesis by demonstrating less flexibility, or more rigidity, at lower levels of ego development. The higher flexibility in the active experimentation mode is also potentially meaningful in that people at this level would be expected to be more enactive, in Piaget's sense of the word. At the individualistic/autonomous levels adaptive flexibility in the adaptive mode of reflective observation is highest of all mdoes. This suggests that as people approach higher levels of ego development they engage this reflective mode with greater flexibility perhaps indicating the ascendence of their internal structures in the interaction with the environment. Of course, the differences between the extent of adaptive flexibility among the four adaptive modes at the higher levels of ego development are not significantly different, so the emphasis must be on the increasing adaptive flexibility in all modes as one increases in ego development.

Psychological Safefy and Adaptive Flexibility. Development in adults is threatened when events occur which reduce a person's feeling of psychological safety. The need for safety tends to supercede consideration of other needs. As a person proceeds toward increasingly integrative complexity the presence of a threat to his psychological safety would be expected to reduce the extent to which he could be adaptively flexible in the engagement of his adaptive modes because his attention would be diverted by safety concerns. Thus our second proposition:

Proposition II: When a person is in a position of low psychological safety, i.e., experiencing stress, change, conflict and a high degree of transition, adaptive flexibility will be reduced.

FIGURE 4-22

Relationship of Adaptive Flexibility
with Ego Development Level
Combined Sub-Samples (N=109)



Correlation(p=)	Adaptive Mode	Legend
.07	CONCRETE EXPERIENCE	+++++++
.20 (.02)	REFLECTIVE OBSERVATION	=======
.22 (.011)	ABSTRACT CONCEPTUALIZATION	-------
.11	ACTIVE EXPERIMENTATION	———
.26 (.003)	TOTAL	*******

To test this proposition it is hypothesized, first, that increased concern about the life issues of stress and change is related to reduced adaptive flexibility. These indicators of low psychological safety were contained in two items among a set of twenty-three life issues presented to the respondents (see Appendix A). They were asked to indicate, on a scale of seven, the degree to which these items were of current concern to them. The two specific items were:

Coping with stress and change

Dealing with changes in my life

We would expect that an increase in concern for coping with stress and change would result in a reduction of adaptive flexibility for the combined samples. This is confirmed (Figure 4-23) only tentatively with a negative relationship (r=-.13, p=.096) between total adaptive flexibility and coping. It appears that this low psychological safety has a slight dampening effect on adaptive flexibility. That effect is demonstrated most in the abstract adaptive mode (r=-.19, p=.023) suggesting that coping with stress and change has the greatest dampening effect on adaptive flexibility in the abstract adaptive mode.

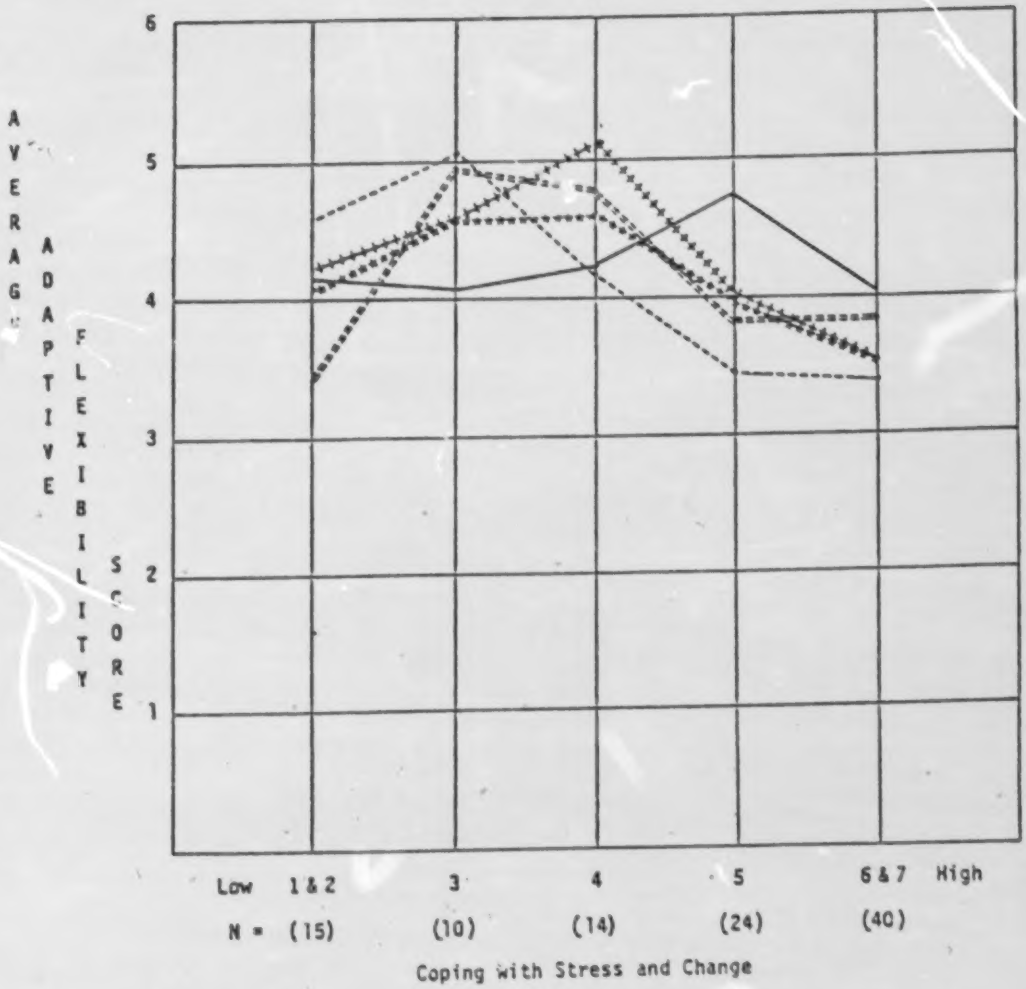
It can be noted that the concrete and abstract adaptive modes are engaged in most flexibly when people express lower levels of concern about coping with stress and change, but when this concern is high, adaptive flexibility in these modes drops below that of the other two modes. Conversely, adaptive flexibility in the active and reflective modes is relatively low when concern for coping with stress and change is low, but flexibility in these modes is greater than that found in the abstract and concrete modes when concern for coping with stress and change is highest. Although the differences are not significant this trend suggests that higher concern about stress has a more constraining effect on the adaptive modes (abstraction and experiencing) by which people grasp knowledge, and a less constraining effect on the adaptive modes (active and reflective) by which people transform that knowledge.

We would also expect that an increase in concern for dealing with changes in one's life would result in a reduction of adaptive flexibility for the combined samples. However, we found no relationship between these two varibles.

Another hypothesis concerning psychological safety and adaptive flexibility suggests that increased conflict in one's life space is related to reduced adaptive flexibility. In the sample of mid-life adults, respondents participated in a workshop during which they performed various exercises which served to portray their life space, their relationships with other people and groups of people, and a longitudinal view of their past and possible future. A panel of researchers evaluated each respondent on a

FIGURE 4-23

Relationship of Adaptive Flexibility
with "Coping with Stress and Change"
Combined Samples (N=109)



Correlation(p=)	Adaptive Mode	Legend
-.12	CONCRETE EXPERIENCE	+++++++
-.07	REFLECTIVE OBSERVATION	=======
-.19 (.023)	ABSTRACT CONCEPTUALIZATION	-------
.05	ACTIVE EXPERIMENTATION	———
-.13 (.096)	TOTAL	*******

number of dimensions including the degree of conflict. Conflict was defined as the extent of "incompatibilities, force and counter-force" (Crary, 1979) a person experiences among the various settings in his life, without regard to the number of complexity of the relationships among settings.

In the sample of mid-life adults conflict, as an indicator of low psychological safety, is negatively related (r=-.34, p=.106) to adaptive flexibility (Figure 4-24). This suggests that as people experience conflict in their life space they tend to reduce their adaptive flexibility. This relationship is borne out in each mode of adaptive flexibility with only reflective adaptive flexibility showing a non-significant relationship with conflict.

A third hypothesis concerning psychological safety and adaptive flexibility suggests that increases in the extent to which a person is experiencing a transition in his life is related to decreases in adaptive flexibility. The respondents in the mid-life adults sample were judged by trained coders on the extent to which they were in a condition of high or low transition on the basis of their self-reported portrayals of their life space, relationships and life process. Transition is defined as the extent to which a person is fully engaged in dealing with major life change, e.g., career shifts, job changes, marital status changes, family structure changes.

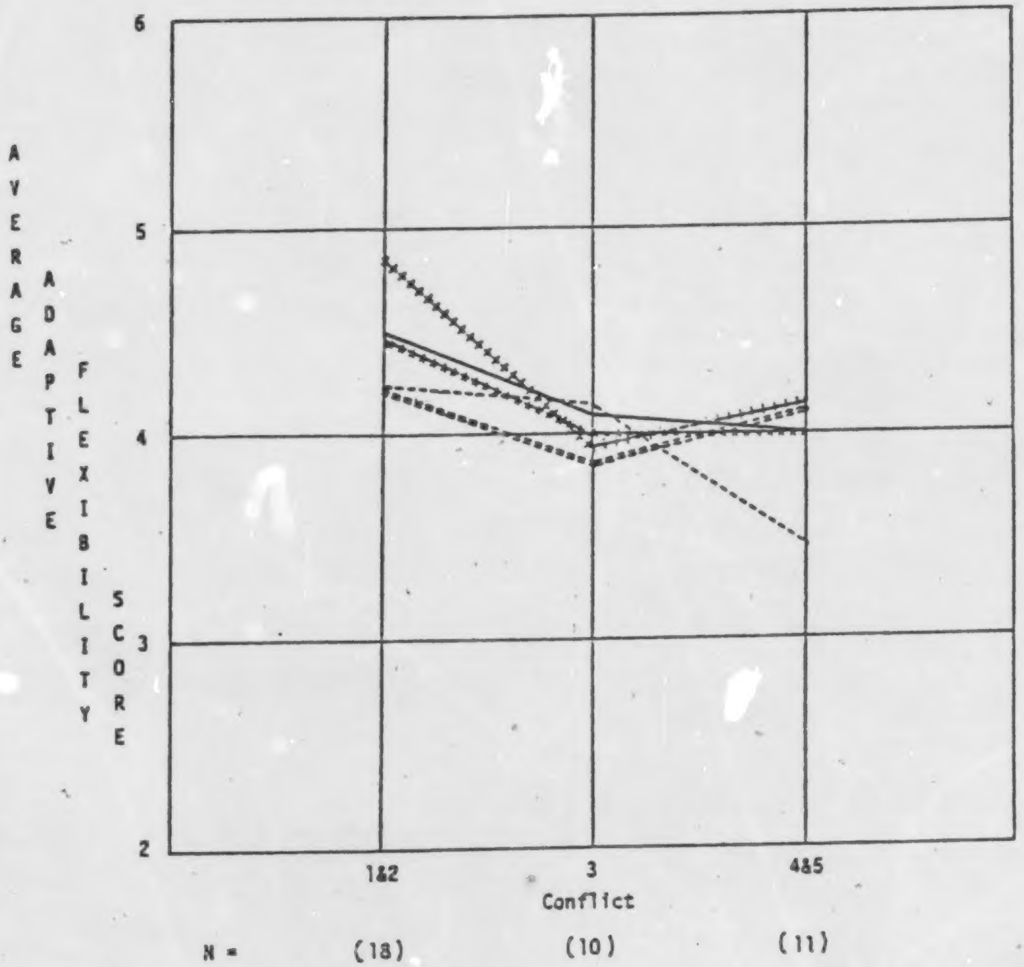
Increases in the extent of transition would be expected to contribute to low psychological safety with a related reduction in adaptive flexibility. Among the mid-life adults the extent of transition was negatively related (r=-.22) to total adaptive flexibility with only a marginal level of significance (p=.089) (Figure 4-25). This result represents a trend in support of our hypothesis, rather than a confirmation.

Coping, Conflict and Adaptive Flexibility. Another view of conflict and stress is that a person with a high degree of adaptive flexibility, i.e., in a position of proactive adaptation, would be able to manage these threats to psychological safety. He could view them as a vital part of the dialectic between himself and the environment. This view of the relationship between adaptive flexibility and threats to psychological safety is more consonant with the first proposition in that higher levels of ego development would permit these threats to be perceived positively as elements to be resolved. Thus, we have two somewhat contradictory hypotheses: (1) adaptive flexibility decreases in the presence of threats to psychological safety, and (2) adaptive flexibility facilitates coping with threats to psychological safety.

In an attempt to understand this issue more clearly we explored the relationship between high and low levels of adaptive flexibility and high and low levels of adaptive flexibility and high and low levels of conflict.

FIGURE 4-24

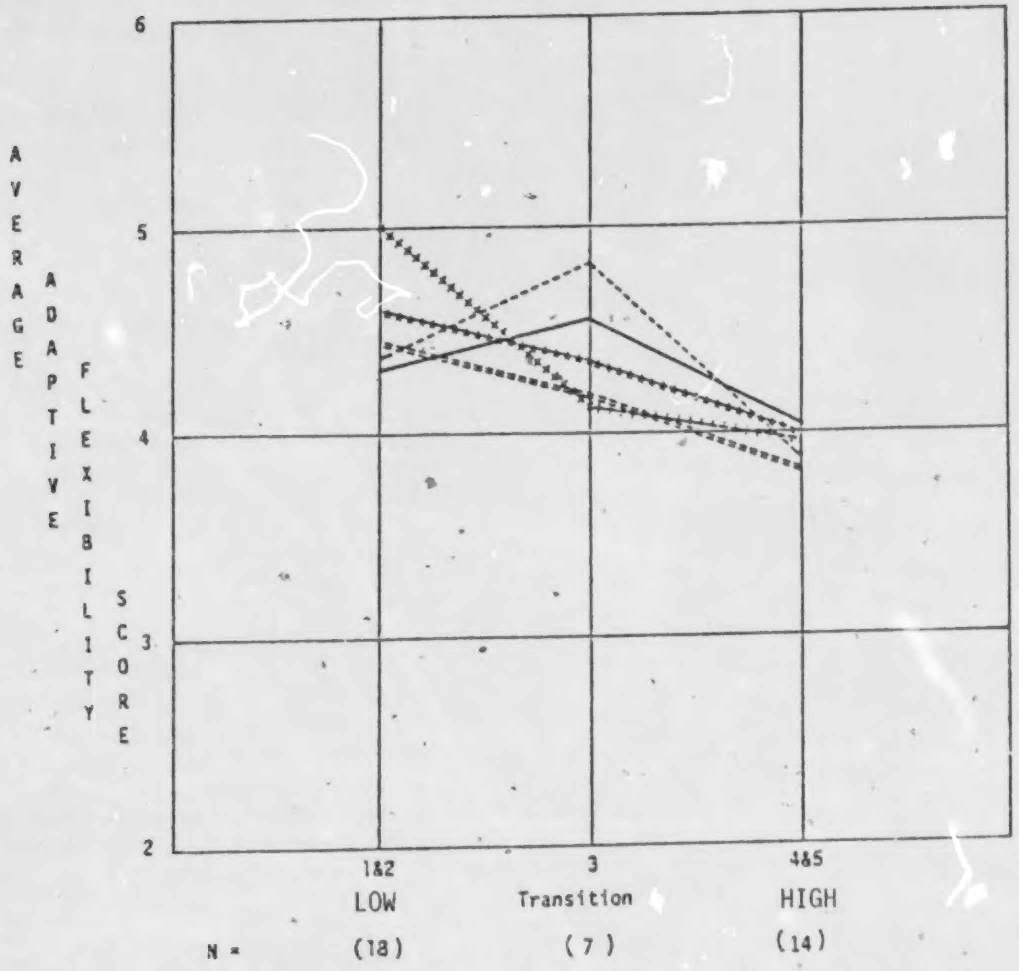
Relationship of Adaptive Flexibility
with "Conflict"
Mid-Life Adults (N=39)



Correlation(p=)	Adaptive Mode	Legend
-.27 (.048)	CONCRETE EXPERIENCE	+++++++
-.15	REFLECTIVE OBSERVATION	=======
-.24 (.065)	ABSTRACT CONCEPTUALIZATION	-------
-.30 (.031)	ACTIVE EXPERIMENTATION	———
-.34 (.016)	TOTAL	*******

FIGURE 4-25

Relationship of Adaptive Flexibility with "Transition" Mid-Life Adults (N=39)



Correlation(p=)	Adaptive Mode	Legend
-.22 (.09)	CONCRETE EXPERIENCE	+++++++
-.18	REFLECTIVE OBSERVATION	=======
-.11	ABSTRACT CONCEPTUALIZATION	-------
-.09	ACTIVE EXPERIMENTATION	———
-.22 (.089)	TOTAL	*******

We assumed that high levels of conflict for a person with low adaptive flexibility would result in the highest degree of stress because he would lack the flexibility to deal with the conflict. On the other hand, we assumed that high levels of conflict for a person with high adaptive flexibility would result in a lower level of stress because he would have the flexibility to deal with the conflict as a contribution to his development. We predicted that with low levels of conflict stress would be lower regardless of adaptive flexibility.

An indicator of stress is the variable noted above--coping with stress and change--derived from the life issues questionnaire. We tested the distribution of concern for coing-with-stress-and-change in these four conditions and found a significant (p=.052, t-test) relationship in the difference in concern for coping-with-stress-and-change between high and low adaptive flexibility situations where there was high conflict (Table 4-19). We see that the condition, high conflict with low adaptive flexibility, is characterized by a high concern for coping-with-stress-and-change while it is lowest in the high conflict high adaptive flexibility situation. This supports the hypothesis that conflict becomes a source of growth in conditions of high adaptive flexibility. It also suggests that previous results showing a negative relationship between conflict and adaptive flexibility may be the product of the presence of considerably more respondents with lower levels of ego development, since low adaptive flexibility in the presence of conflict creates high concern for coping-with-stress-and-change, or low psychological safety.

Strength of Self and Adaptive Flexibility. As a person begins to view himself as having a sense of self-direction and a firm identity it could be assumed that his internal structure is becoming well defined. Such a structure would place a person in the position of being able to transact with the environment in more choiceful ways. He would be able to increase his control over the dialectic exchanges between his internal structures and the environment with this perspective on his self. Thus, the extent to which a person has a strong sense of self, the greater his capacity for proactive adaptation. From this perspective, then, we would expect a positive relationship between indicators of self strength and adaptive flexibility as noted in this proposition.

Proposition III: When a person experiences a high degree of self-direction or a strong sense of identity, the person will exhibit higher degrees of adaptive flexibility.

The first variable to be considered is the extent to which a person is self-directed or other-directed in relationships with other people. Once again, this variable was determined by a panel of researchers who observed respondents in the mid-life sample. The criteria of their judgements was:

TABLE 4-19

COPING IN THE FOUR CONDITIONS OF STRESS

		Adaptive Flexibility		
		Low	High	
Conflict	High	$\bar{X}$ = 5.6 N = 13	$\bar{X}$ = 3.5 N = 8	← (t-test, p = .052)
	Low	$\bar{X}$ = 5.0 N = 7	$\bar{X}$ = 4.7 N = 11	

> . . . the extent to which a particular set of contexts are determining of the person as opposed to being determined by the person. Low ratings apply to those who structure their flow of action through the movement of others, largely assuming a position of reactiveness ot his/her contexts. The high rating refers to a life-style in which the person for the most part assumes an intiatory posture in interaction within contexts, in effect orchestrating the development of his/her contexts (Crary, 1979, p. 21).

When considering the context of interpersonal relationships we would expect a strong positive relationship between self direction and adaptive flexibility. A person would be expected to be aware of the source of his directedness--himself or other people--in social interaction. Total adaptive flexibility is related (r=.26, p=.053) to self-directedness in relationships (Figure 4-26) supporting the proposition that a high degree of self-direction is relfected in higher degrees of adaptive flexibility. This relationship is reflected in each of the adaptive modes, though significantly only in the active mode (r=.28, p=.045). With this limited population of mid-life adults, this result suggests that mid-life adults become more adaptively flexible in the active mode when their sense of self-directedness is greater.

A second test of the proposition relating strength of the self and adaptive flexibility is the hypothesis that the more a person expresses concern about becoming his own person the more he will demonstrate a higher degree of adaptive flexibility. In the context of the twenty-three item questionnaire of life issues, noted earlier, to which respondents were asked to rate the extent each issue was a current concern, a specific item raised the issue of becoming one's own person. The item was phrased as follows:

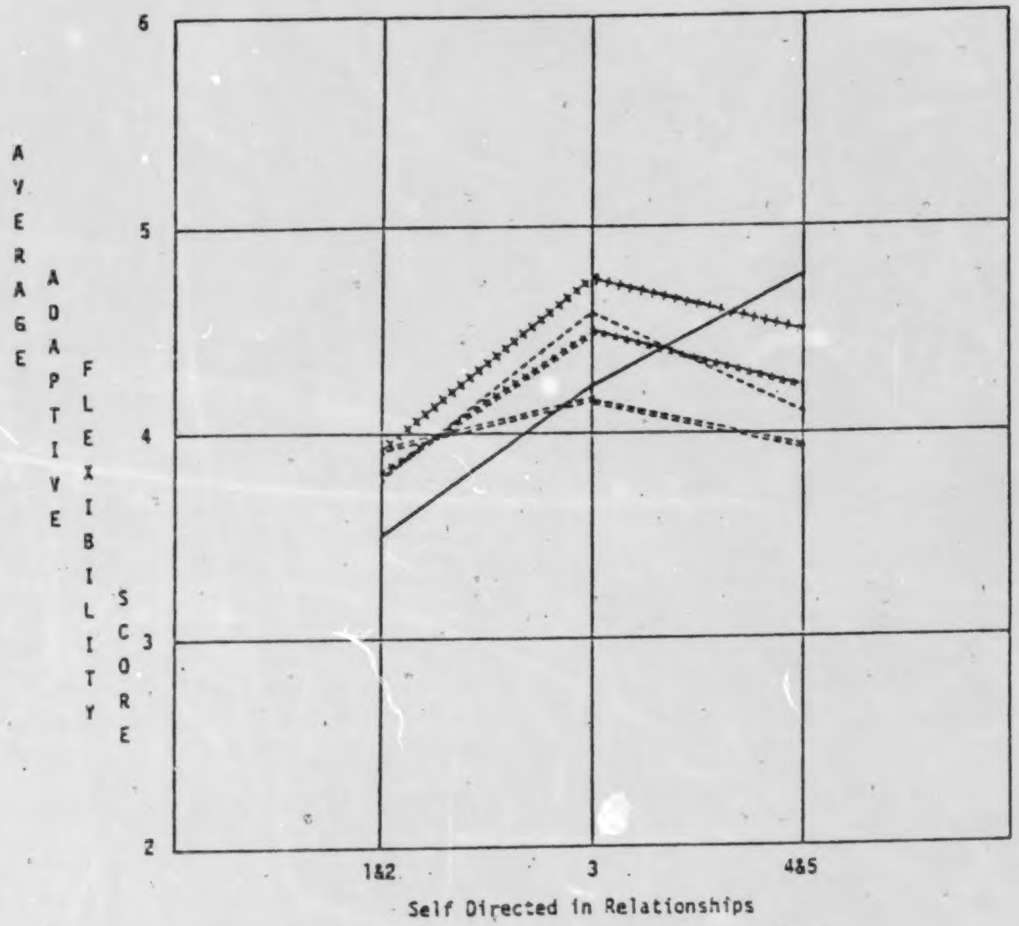
Becoming my own Person with Identity and Direction

We would expect a positive relationship between this variable and adaptive flexibility. However, we found no significant relationship. The positive but non-significant relationship suggests a possible trend in the direction of the hypothesis, but the relationship is possibley confounded by two possible ways this item can be interpreted by the respondents. Extremely low concern for this issue of becoming-my-own-person could indicate a lack of awareness of this issue, while extremely high concern about this issue could indicate a feeling that more self acceptance was needed by the person. Both of these kinds of responses would indicate low self identity. Thus, the item may contibute to the lack of relationship more than the conceptual hypothesis.

Complexity and Adaptive Flexibility. A prerequisite of adaptive flexibility is the ability of a person to deal with complexity through more complex

FIGURE 4-26

Relationship of Adaptive Flexibility with "Self Directed in Relationships" Mid-Life Adults (N=39)



N = (10) (21) (8)

Correlation(p=)	Adaptive Mode	Legend
.15	CONCRETE EXPERIENCE	+++++++
.14	REFLECTIVE OBSERVATION	=======
.19	ABSTRACT CONCEPTUALIZATION	-------
.28 (.045)	ACTIVE EXPERIMENTATION	———
.26 (.053)	TOTAL	*******

internal structures. The creation of increasingly complex internal structures is often referred to as cognitive development. Thus, the fourth proposition we presented is stated as follows:

Proposition IV: An increase in cognitive developmental complexity is accompanied by an increase in adaptive flexibility.

To test this proposition it is hypothesized that the greater the number of conceptual constructions a person uses to describe his total life context the greater adaptive flexibility he will demonstrate. This hypothesis assumes that a major component of internal structural complexity is the constructions, as expressed in the words a person uses, that can be called upon to describe and manipulate one's thoughts and interactions with the environment (Pazy, 1979). This notion was operationalized in the context of the Spencer workshops. In the workshop exercises, the mid-life adults respondents engaged in a number of initial exercises in which they portrayed the configuration of their life structures graphically and by analogy. During these exercises, the facilitating researchers noted the words each respondent used to describe his or her life structures. A list of these person-specific words was later presented to each respondent for verification as their own terminology. Each respondent had the opportunity to eliminate or add words in order to make the list truly representative of his or her set of constructs. The final list of constructs became the variable we are using here called "number of constructs."

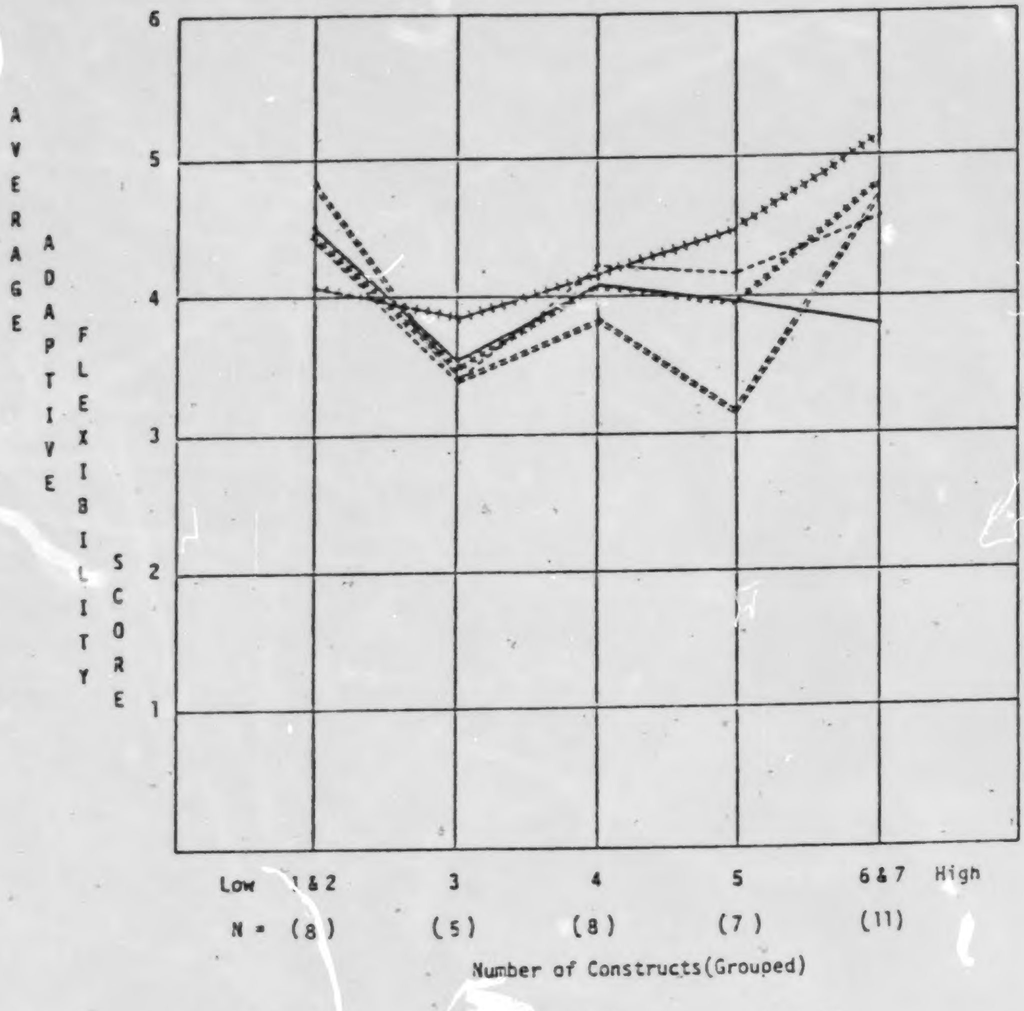
We would expect the number of constructs a person uses to increase as the person approaches a more proactive adaptation, and as the person demonstrates increased adaptive flexibility. With the sample of mid-life adults (N=39) we found this relationship to be present for total adaptive flexibility (r=.25, p=.061). This level of relationship suggests that adaptive flexibility is an indicator of increasing complexity as represented by the number of constructs a person uses (Figure 4-27). Adaptive flexibility in the concrete adaptive mode contributes most to the correlation of total adaptive flexibility (r=.28, p=.04). Adaptive flexibility in the other three modes all related positively but without sufficient significance. In the figure we note the trend that adaptive flexibility in the three modes of concrete experience, abstract conceptualization and active experimentation increase in parallel with the increase in the number of constructs. Adaptive flexibility in the reflective mode is consistently less than in the other modes. It does increase in concert with the other modes at the highest numbers of constructs, though still somewhat below the other three modes. This lagging of adaptive flexibility in the reflective mode could indicate that the measurement of the number of constructs does not caputre those constructs still in the stage of formulation. Rather, higher adaptive flexibility in the other three modes suggests that constructs reported by respondents represented constructs that are in frequent, active use.

FIGURE 4-27

Relationship of Adaptive Flexibility

with "Number of Constructs"

Mid-Life Adults (N=39)



Correlation(p=)	Adaptive Mode	Legend
.28 (.04)	CONCRETE EXPERIENCE	+++++++
.17	REFLECTIVE OBSERVATION	=======
.11	ABSTRACT CONCEPTUALIZATION	-------
.12	ACTIVE EXPERIMENTATION	———
.25 (.061)	TOTAL	*******

A second hypothesis to test this proposition linking complexity with adaptive flexibility is that the greater the number of polarities a person recognizes and owns within his internal structure the more he will demonstrate increased adaptive flexibility. Polarities are viewed as indicators of complexity. A person with no polarities--elements within his internal structure which are somehow construed to be opposites one of the other--would lack much complexity. The extent to which a person can identify polarities operating within him indicates the level of complexity which can be entertained. The assumption is that if a person can hold conflicting--or polar--concepts without eliminating one side of the polarity, the polarities can be used toward new levels of synthesis, new levels of complexity. Further, if these polarities are not only recognized but closely owned by the person, it is more likely that the person is dealing with the complexity embodied in the polarity in a way that will lead to greater synthesis and more profound development. If a person recognizes and closely holds (owns) many polarities we would expect a high degree of adaptive flexibility to be present by which to manage these polarities.

Three variables were constructed to measure the polarities a person recognizes and owns. The first is simply the number of polarities a person identifies within his total life context. This, and the other polarity variables, were obtained in the context of the Spencer workshops in an exercise in which each person was asked to list all of the polarities they see operating in their life. A polarity was defined as any contrasting elements a person feels and experiences, regardless of any formal definition of the terms and their logical opposites. The second variables involved the degree to which each set of polarities was experienced by the person simultaneously. This indicated the extent to which a person owned each polarity. The third variable, the polarities index, is a composite variable, or factor, which consists of the ownership of polarities, the extent to which each polarity is experienced simultaneously for the person, and the strength of the conflict between the polarities as judged by an expert panel of researchers.

We expect that increases in all three polarities variables would be accompanied by an increase in adaptive flexibility. However, we find that all three variables relate negatively with adaptive flexibility with our sample of mid-life adults. The number of polarities basically does not relate to adaptive flexibility other than showing a possible negative relationship that lacks significance. The number of owned polarities, also, does not relate to adaptive flexibility in our sample. In addition, the suggested relationships are negative with concrete and abstract adaptive flexibility, and positive with reflective and active adaptive flexibility; all not significantly related ($p < .10$). And finally, the polarities index relates negatively with total adaptive flexibility ($r=-.24$, $p=.09$). This finding suggests that polarities may be viewed as conflicts by the respondents of this study rather than content for enriching the interaction between the person and the environment. The more likely explanation is that the lack of relationship between these polarity variables and adaptive flexibility indicates some intervening variable is acting to affect the relationship of these variables.

Life Space/Relationships Flexibility and Adaptive Flexibility. People can experience their life in ways that bring variety and richness to them and the environment. This can happen when people engage with their environments by flexibly moving within that environment, by creating highly differentiated life spaces and relationships, and by building networks of relationships and contexts. Marcy Crary (1979) has developed these dimensions with clarity and feeling:

> Some people lead lives with a great deal of freedom of movement and variation in involvement within their different contexts. Either through their own person and/or the nature of the contexts they engage within--there is an appearance of a great deal of flexibility in their life structure. The contrasting life-style is one in which there is much routine, pre-arranged structuring of day-to-day events, likely leading to much repetition of events, activities, relationships within each of the person's contexts. Low rating on this scale would likely imply a higher degree of role-bounded situations and involvements. A high rating implies a relatively greater amount of "spontaneous" living (Crary, 1979, p. 20).

A related dimension is that of differentiation within a person's life space. Crary states that:

> This dimension relates to the degree of heterogeneity of contexts within a person's life-space. A life-space which is differentiated is multifaceted, containing a variety of components or regions within its boundaries. . . . Applied to the life-space as a whole (within and across contexts) the low end of the scale denotes a life space in which not one of the contexts seem to stand apart from the others in terms of the person's experience of them. The high rating refers to a life style in which the person clearly experiences variation and contrasts within and across their different contexts (Crary, 1979, p. 20).

A specific kind of flexibility is captured in a third dimension, that of structural connectedness of life contexts. This dimension, also created by Crary, is described in this way:

> This dimension pertains to the arrangement of contexts in relation to one another. Within some life-spaces there are, in effect, constellations of settings in which the persons, activities, pursuits involved are intermingled. In contrast to this structure, other life-spaces may contain distinctly separate realms of relationships and activities with minimal or no communication, information, interaction between them (Crary, 1979, p. 20).

The fifth proposition states the relationship between these three dimensions and adaptive flexibility:

Proposition V: The extent of flexibility expressed in a person's relationships with others is associated with the extent of adaptive flexibility a person demonstrates.

Flexibility in this proposition includes the related concepts of differentiation and structural connectedness.

The test this proposition we hypothesize that increases in the flexibility, differentiation and structural connectedness a person experiences in his interpersonal relationships will be indicated by an increase in adaptive flexibility. These three variables were constructued in the context of a series of exercises in which workshop participants portrayed their significant relationships. These variables were drived by the collective judgement of facilitating researchers.

Supporting the proposition as stated in the hypothesis, we fine that mid-life adults (Figure 4-28) increase the flexibility of their relationships as they increase their total adaptive flexibility (R=.36, p=.12). The relationship between adaptive flexibility and relationship flexibility is strongest in the active adaptive mode (r=.41, p=.005) and the abstract adaptive mode (r=.37, p=.010), with reflective adaptive flexibility approaching significance (r=.2[illegible], p=.098). These results suggest that a person's relationships are increasingly flexible in association with the person's increasing adaptive flexibility.

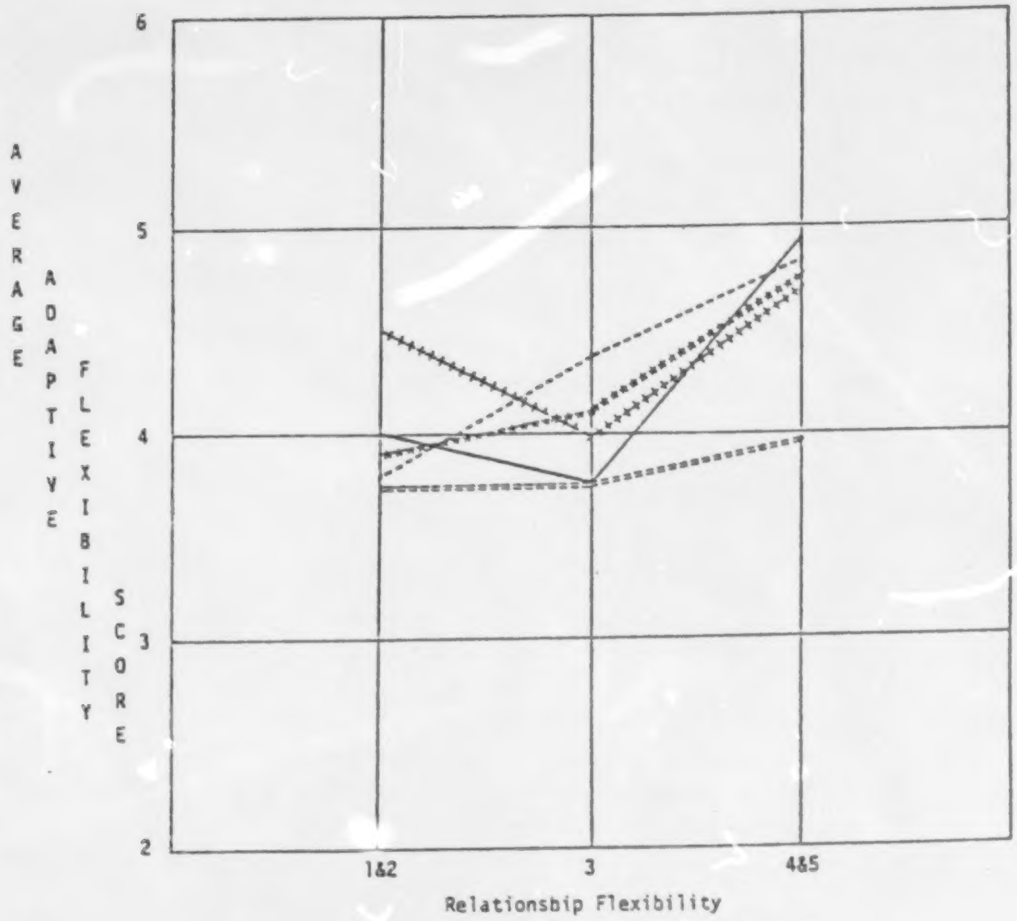
The positive relationship (Figure 4-29) between the flexibility dimension of differentiation of relationships and adaptive flexibility (r=.35, p=.014) confirms the hypothesis that relates increased flexibility in relationships (in this case, differentiation) to increased adaptive flexibility. This result suggests that relatively high levels of adaptive flexibility are required to manage highly differentiated relationships.

The structural connectedness of relationships, however, is not confirmed. There is no significant relationship between adaptive flexibility and the extent of structural connectedness a person experiences in his relationships with others. It appears that structural connectedness of relationships is either unrelated to adaptive flexibility or the relationship is confounded by other intervening variables.

Summary Conclusions. Adult development has been conceived of as a function of adaptation, the transactions between the internal structures of a person and the environment. Development is viewed as following a continuum from enactive adaptation to proactive adaptation, i.e., from a state of relative absence of person-environment transactions to the state of the dialectical process of these transactions becoming central to continuing

FIGURE 4-28

Relationship of Adaptive Flexibility with "Relationship Flexibility" Mid-Life Adults (N=39)

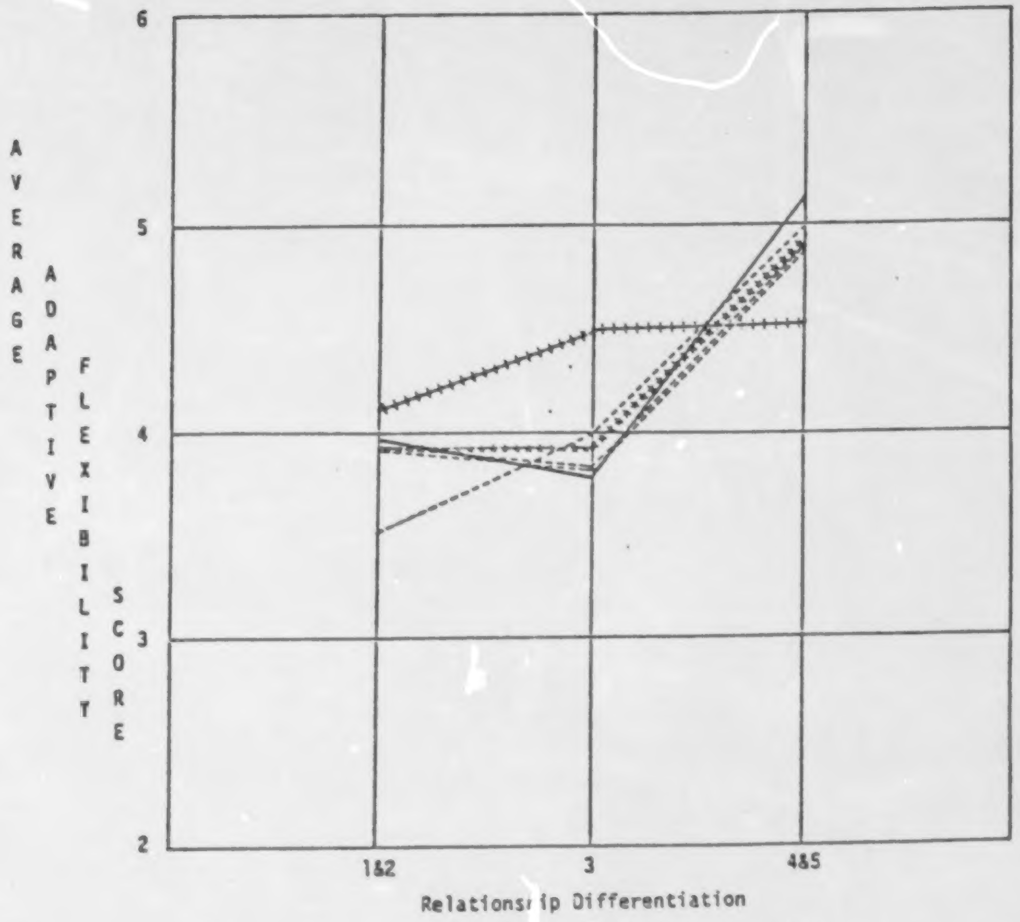


N = (15) (11) (13)

Correlation(p=)	Adaptive Mode	Legend
.06	CONCRETE EXPERIENCE	+++++++
.21 (.098)	REFLECTIVE OBSERVATION	=======
.37 (.010)	ABSTRACT CONCEPTUALIZATION	-------
.41 (.005)	ACTIVE EXPERIMENTATION	———
.36 (.012)	TOTAL	*******

FIGURE 4-29

Relationship of Adaptive Flexibility with "Relationship Differentiation" Mid-Life Adults (N=39)



N = (11) (13) (14)

Correlation(p=)	Adaptive Mode	Legend
-.04	CONCRETE EXPERIENCE	+++++++
.30 (.031)	REFLECTIVE OBSERVATION	=======
.40 (.005)	ABSTRACT CONCEPTUALIZATION	-------
.34 (.017)	ACTIVE EXPERIMENTATION	———
.35 (.014)	TOTAL	*******

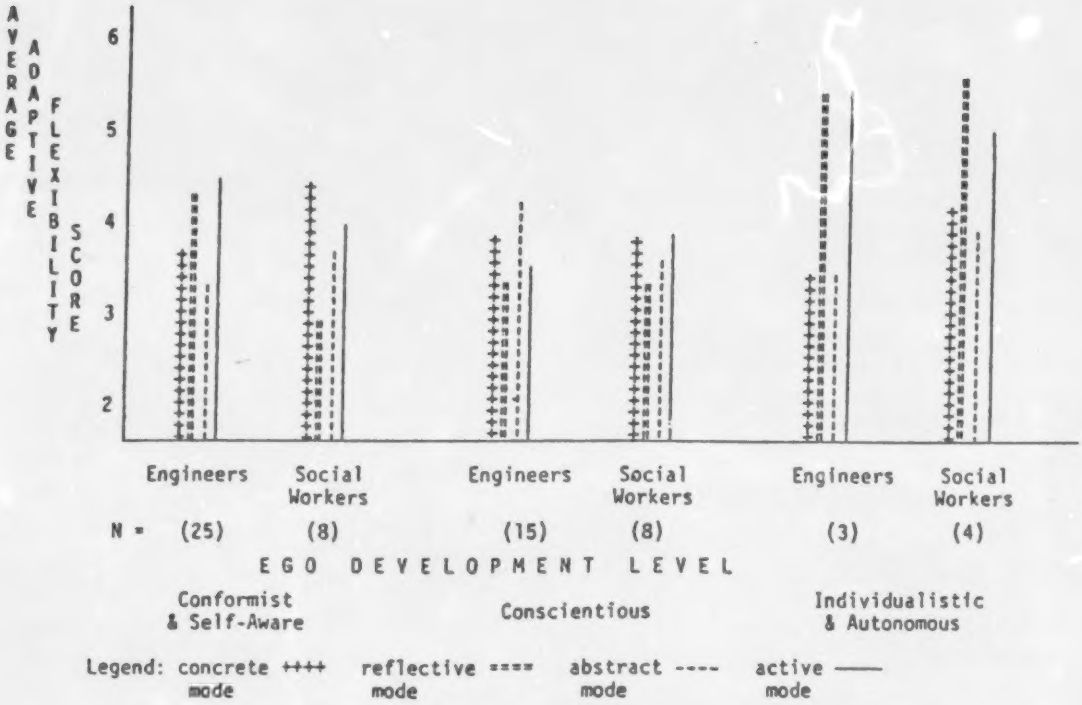
development. Within this view of development the process variable of adaptive flexibility has been identified. Through a construct validation of this variable we have developed an understanding of its relationship to the continuum of development. The central conclusion is that an increase in adaptive flexibility is associated with increases in the level of a person's ego development. By inference, increases in adult development are accompanied by increases in adaptive flexibility. Other elements of the construct complement this view. Increases in cognitive complexity are important to the development of a mature ego. They permit an increased capacity for a person to develop increasing integration of the adaptive modes by which he transacts with the world. Increases in the extent of self-direction a person demonstrates is a central feature of proactive adaptation, which, in turn, is conceptually linked to high levels of ego development. These increases permit a person to engage in transactions with the world sufficiently to encourage increases in complexity and the integration of disparate adaptive modes. In addition increases in the flexibility and differentiation a person experiences in interpersonal relationships are associated with increases in ego development. This flexibility contributes to the enhancement of transactions between the person and the most salient part of the environment, the social context, toward a state of proactive adaptation in which transactions between a person and other people are increasingly authentic, open and growthful. Adaptive flexibility, by its association with these variables of cognitive complexity, self-directedness, and flexibility in relationships, is reinforced as an indicator of increasing ego development, our primary indicator of proactive adult adaptation. Thus, if a person increases in adaptive flexibility we can expect an associated increase in ego development especially in its aspects of cognitive complexity, self-directedness and interpersonal relationship flexibility. In effect, adaptive flexibility is associated with progress toward proactive adaptation on the developmental continuum.

Implications for Future Research. In the process of testing the hypotheses which operationalized our theoretical propositions a number of trends were suggested in the data which seem worthwhile to pursue in subsequent research. These relationships were found to lack sufficient significance to warrant any definitive statement, but were sufficiently suggestive to create interest for further study.

One question that became apparent in the consideration of the relationship between adaptive flexibility and ego development level concerned the differential patterns among two sub-sample groups. We noticed certain trends when the data were displayed to reflect how each of these groups--engineers and social workers--demonstrated adaptive flexibility in each adaptive mode, holding constant the variable of ego development (Figure 4-30). We noticed, for example, that for both groups respondents at the lower levels of ego development demonstrated a differentiation of adaptive flexibility among the four adaptive modes. This may help to explain, if it can be more substantially demonstrated, the relationship of decreased adaptive flexibility with lower levels of ego development. Another question arises

FIGURE 4-30

Relationship of Adaptive Flexibility
with Ego Development Level
for Engineers and Social Workers



as these particular data are considered. Why do the modes in which each sub-sample demonstrates the lowest adaptive flexibility change from group to group? For the engineers adaptive flexibility is least in abstract conceptualization for those engineers at the lower levels of ego development (which is the bulk of engineers in this sample). For social workers adaptive flexibility in the reflective mode is the least. On the other hand, adaptive flexibility in the active mode is highest with the engineers at this level of ego development, but it is highest in the concrete mode for social workers. A suggestion that might contribute to further consideration of these trends is an hypothesis of professional deformation. Griggs (1980), Manring (1980) and Sims (1980) suggest that engineers experience, as a product of their professional training and work environments, a deforming of their adaptive styles in favor of the use of the abstract mode. If this is the case we might expect that they would demonstrate the greatest adaptive flexibility in this mode. In correlating the adaptive flexibility of engineers with their ego development level we noticed that only adaptive flexibility in the abstract mode correlated positively and significantly (r=.27, p=.04) with an increase in ego development. This might suggest that engineers are most adaptively flexible in the adaptive mode which is most highly demanded in their profession. On the other hand, when we look at the bulk of engineers in this sample and find that they fall in the lower ego development levels, the opposite suggestion could be made; that engineers are most rigid in the abstract mode and that professional deformation may accentuate the use of a particular mode but not adaptive flexibility in the engagement of that mode. Thus we have two contrasting views of professional deformation which require further research.

This issue is also apparent in the case of the sub-sample of social workers. Adaptive flexibility in the reflective mode contributed most (r=.51, p=.001) to the correlation of total adaptive flexibility with ego development (r=.54, p=.001). Adaptive flexibility in the active mode contribured also (r=.33, p=.04) to this total relationship. This might suggest that adaptive flexibility in the relfective mode especially and the active mode secondarily is an indicator of professional emphasis of these adaptive modes for social workers. However, we notice that sixteen ot the twenty social workers in this small sample who the least adaptive flexibility in the reflective mode at the lower and middle levels of ego development. Only at the higher levels of ego development do the four social workers demonstrate a high level of adaptive flexibility in this mode (which obviously accounts for the high correlation). Again we see, as with the engineers, that professional emphasis, or deformation, of social workers may result in a loss of adaptive flexibility in the mode that is emphasized by a profession. With social workers this mode would be primarily reflection and secondarily action.

Both of these analyses of trends suggest an even more supportive notion to the professional deformation hypothesis; that professional deformation prevents the orderly development toward integrative complexity due to the emphasis on one or two adaptive modes. The lack of adaptive flexibility in the emphasized modes at lower levels of ego development (where the larger proportion of the samples of engineers and social worers were(suggests that development toward proactive adaptation is truncated by the encouragement of the use of limited adaptive modes while adaptive flexibility in those modes is discouraged. We are not in a position to do other than to suggest further research on this interesting and perplexing problem.

A second question became apparent as we considered the variables of polarities, conflict, transition, stress, change, differentiation of relationships, and the structural connectedness of relationships. Considered as separate variables they were related to adaptive flexibility in different ways. But each of them could be considered as indicators of complexity. The presence of polarities which are recognized and owned by the person may indicate that the person is able to consider greater ambiguity and complexity. Conflict, as has been demonstrated in the results of this study, can represent a form of complexity which is positively related to increased adaptive flexibility. The extent to which a person is experiencing a transition in his life may represent an increase in the complexity with which he must deal. The presence of stress and change may also represent increases in complexity in that they create for the person feelings and experiences that extend their awareness and the need to adapt more flexibly. And, extensive differentiation of interpersonal relationships and a high degree of structural connectedness of these relationships may also represent forms of increased complexity. Since increased complexity is an important part of adult development, it is suggested that the extent to which each of these variables represents complexity can be studied. Further, the relationship of these variables as indicators of complexity may be added to the construct of adaptive flexibility. This approach may treat a problem that occurred in the course of this inquiry, i.e., the choices of construct variables were not as fortuitous as might have been hoped. A regression analysis of these variables, when fully conceptualized as complexity variables, may help to determine the extent to which they contribute to development and their relationship with adaptive flexibility. Such an exercise goes beyond the scope of this inquiry, but is recommended for subsequent research.

Additional issues became apparent in the course of this inquiry. The work of Fishbein and Ajzen (1975) suggests that many writers and researchers do not clearly define their use of attitudinal varibles. Their multi-component view of attitude suggests that the intervening variables of affect, cognition and behavioral intention are not differentiated in much research. In this inquiry we have dealt with attitudes in terms of self-report concerning a person's behavior. Fishbein and Ajzen's perspective suggests that this inquiry could be expanded by observing actual behavior rather than or in addition to self-reported behavior. Alternatively, the measurement of the cognitive aspects of adaptation could be measured in terms of perceptual responses, or verbal statements of beliefs. Or, the measurement of the affective aspects of adaptation could be measured in terms of sympathetic nervous responses or verbal statements of affect. These distinctions could bring increased clarity to our process of validating adaptive flexibility.

Heinz Werner (1957) presents the orthogenetic principle of development which reflects our dimension of concrete and abstract adaptive modes, and in another sense captures our view of development as the movement from enactive through reactive to proactive adaptation.

> [The] orthogenetic principle . . . states that wherever development occurs it proceeds from a state of relative globality and lack of differentiation to a state of increasing differentiation, articulation, and hierarchic integration (p. 126).

In his discussion of development he raises important issues which could inform further inquiry into our process of development through adaptation. He differentiates the uniformity and multiformity of development by saying that "the workings of the orthogenetic low as a uniform, regulative principle [has] to be specified through the ordering and interpretation of the multiform operations" (p. 132). This suggests that our attempt to discover the uniformity of adaptive flexibility can be enriched by further inquiry into how it is differentiated.

He also raises the issue of continuity versus discontinuity of development, identifying the question of "reducibility of later to earlier forms--emergence--and the transition between later and earlier forms--intermediacy" (p. 133). The inquiry into adaptation and the process of adaptive flexibility could be focused on the issue of how emergence of development occurs through adaptive flexibility and what the role of adaptive flexibility is in the transition from, for instance, reactive to proactive adaptation.

The problem of unilinearity versus multilinearity, which Werner also raises, encourages us to strive for an understanding of the developmental sequence through the study not only of sample populations of people but of individual processes of development: The paths individuals take to development might inform our view of the general patterns of development and the processes by which they are obtained.

And finally, Werner raises the issue of fixity versus mobility which is an issue we recognized in the discussion of professional deformation. He notes that "the priciple of fixity would finally lead to rigidity of behavior if not counterbalanced by the polar principle of mobility" (p. 138). This suggests that we could inquire further into the interaction of reactive adaptation and proactive adaptation.

The work of Baltes et al. (1973, 1980) and Nesselroad and Rsses (1973) suggests attention to development at all stages of a person's life span.

Baltes, Reese and Lipsitt (1980) present the notion that "no particular period of the life span (such as infancy) possesses primacy for the origin or location of important developmental processes" (p. 70). This suggests that the structures and processes of adaptation could be investigated at any and all stages of life including (in addition to our focus on mid-life) adolescence, young adulthood, the maturing years beyond mid-life, and the aging process. We could inquiry into the nature and role of adaptive flexibility at these various life stages.

A number of problems presented themselves in the course of this inquiry which can be considered in future research. A major problem is represented by the propositions we developed which were not confirmed in the data. The propositions either need to be tested with larger populations and better formulated hypotheses, or reconsidered as viable propositions.

The possibility of random variance, test taking error, presents a problem for the further development of the Adaptive Style Inventory and the variable of adaptive flexibility. It is necessary to determine to what extent random variance contributes to the extent of flexibility a respondent demonstrates. This is particularly true for the active-reflective dimension where we noted higher adaptive flexibility than in the abstract-concrete dimension. We are encouraged by the seemingly viable relationships between adaptive flexibility and the variables that are indicators of development. If the sources of random variance can be identified and accounted for, these relationships can be understood more clearly, and they may be found to be stronger than thus far demonstrated.

Another problem became apparent as the research proceeded; the population samples we had obtained were not sufficient in number to be able to draw definitive conclusions about the data. Drawing samples from different sources was the product of the two research projects sponsored by Spencer and NIE. Each sample was limited for various reasons including the costs and energy required to obtain qualitative as well as quantitative data from the respondents, and the loss of respondents in various stages of the analysis due to faulty or missing data. Subsequent studies should strive to enlarge the sample in order to obtain more significant results.

This inquiry has focused on the extent to which a person demonstrates integrative complexity, or proactive adaptation. The indicator of this quality, adaptive flexibility, does not distinguish levels of adaptation between enactive adaptation and proactive adaptation. Some method is required to provide discrete differentiation along this continuum. More discrete analyses could be made if certain points along the continuum could be identified, especially in the range of reactive adaptation.

We also noted the need to include the variable of purposiveness in order to separate the direction of adaptive flexibility. A person's purposes would help us determine more clearly whether he was being adaptively flexible in the service of reactive or proactive adptation. The inclusion of this variable would clarify and refine our conceptualization of adaptive flexibility.

Our attention has been largely on the person in the person-environment interaction. Another approach might emphasize more attention to the role of the environment. If environmental messages were consistent would it lead to higher adaptive flexibility? What role does complexity in the environment play in the development of adaptive flexibility? We have discussed the level of environmental press in our discussions of "transition" and "conflict." What are other indicators of complexity in the environment which could help clarify the impact of environmental complexity on adaptive [illegible] These are potentially interesting lines of inquiry.

[illegible] research was based on the assumption that the Adaptive Style Inventory's presentation of situation types and alternative responses would give a more accurate indication of adaptive flexibility than a more direct inquiry which might merely ask the respondent, How flexible are you? or In what ways are you flexible? This question is worth raising in future research as we noted in the discussion of the lack of clarity in the conceptualization of attitudes as present by Fishbein and Ajzen. And finally, we have not begun to exhaust the measures of flexibility that are available. We have purposely confined our research to the instruments and other forms of measurement we felt would best address the theoretical propositions with which we were concerned.

V. The Assessment of Education and Work Environments

Ronald Fry

A. Introduction

This section of our Report focuses primarily on the environmental aspects of the adult learner-professional career interaction process under study. Having developed an applied theory of experiential learning in Section II and means for assessing genotypic adaptive competencies in Section IV, we now turn to the development of means for better understanding the impact of learning and work environments upon one's acquisition and specialization of certain competencies. Specifically, the aim of the research reported in this section is to:

(1) Develop a system for assessing environmental press that is commensurate with that already developed to assess personal competency. If we are to ultimately understand when and how adaptive competencies that distinguish professionals are acquired, then we must understand person-environment interactions in the context of the current, front-loaded educational environments and in work environments that follow. Hence it is necessary to understand and measure those aspects of one's environment that interact with the person to create career orientation, professional mentality, adaptive style, and the like.

(2) Understand the relationships between preparatory education and career development. Once we can measure educational environments in ways commensurate with the learner and then assess P-E interactions in that context, we can begin to understand when, where and how professional education socializes, accentuates, and specializes individuals into their different styles as they enter the world of work. How large an impact is it? Where does it occur: in courses, in colleges at large? A further extension of this objective for us here is to be able to assess person-environment interactions at work, as well. Hence we would be in a position to compare and contrast the acquisition and development of adaptive competencies through P-E interaction in school and at work.

In Section V-B, the issue of which environment is significant to our inquiry and what to look for in that environment is discussed. The argument is posited that one's formal professional education does impact upon that person's professional mentality. A model and methodology is suggested to assess learning and environments in terms of their affective, perceptual, symbolic and behavioral complexities. With data from our Professional Schools Study (III-B) we demonstrate the usefulness and commensurability of this framework to our overall inquiry. Finally, the impact of environmental press in formal courses is explored and methods are demonstrated that should enable us to do further research to document the impact of course design and management on the forming of one's professional mentality as they enter the world of work.

Section V-C examines the concept of learning environment press from the idiosyncratic perception of the individual adult learner. In contrast to the previous section, here we assume only that the environment is that which the learner perceives. Using a panel of students in engineering and social work we explore their selection of what is a significant environment and how that selection effects the accentuation of their developing competencies. In essence we are trying to understand here the world of professional education other than coursework. Again, a consistent model for assessing environments is applied and shown to result in useful statements about the press of professional education and its impact on competency development.

Section V-D expands our model of learning environments to the world of work. Research from the Technical Work Environments Study (III-D) is reported and used to develop instrumentation to assess the environmental press of technical work environments (engineering).

Section V-E then combines previous assessment models and tools to measure person factors with the results from V-B, V-C, and V-D to develop an overall model of person-environment interaction, be it in educational or work environments. The need for commensurate measures and use of our research to produce meaningful insights about P-E interactions is discussed.

Sections V-F and V-G then apply our P-E model to study actual interaction effects in person-job contexts to begin to look at the impact of P-E match vs. mis-match. In Section V-F, engineers in current work settings are studied in terms of degree of fit between their competencies and job demands. The relation of the degree of fit to job satisfaction, isolation, and blockedness in one's career is studied. Section V-G finally relooks at our Alumni samples to measure person-job match and mis-match is pivotal skill areas necessary to each of five professional career levels. The relationship of match, overqualification and underqualification to productivity, satisfaction, and potential for growth is then explored.

B. On the Definition and Measurement of Environmental Press in Professional Education

Introduction. The intent of this section is to establish the basic framework and measurement constructs with which we intend to assess learning environments in order to ultimately assess person-environment interactions. In previous sections, the theory and methodology underlying the assessment of the individual has been developed and refined. Our treatment of the environment here is less ambitious. We find that there is little theory developed, let alone methodologies, to measure and assess environmental press in meaningful terms that enable us to then measure person-environment interactions in commensurate terms. The latter must be our ultimate objective if we are to understand how adults (i.e., professionals) develop, accentuate, and manage their unique competencies throughout careers and life in general.

In this discussion, we will present literature reviews and data collected as part of the Professional Schools Study (Section III-B) and the Technical Work Environment Study (Section III-D). Both studies were pilot efforts to begin the development of models and tools to measure environmental press in professional education and in professional work settings. While the findings are preliminary in nature and, in some cases, limited by sample size, they are nonetheless useful to us in raising issues for further research. More than presenting results, the primary purpose of this section is to share our inquiry process and overall methodology.

We begin with the concept of professional mentality: that set of attitudes, beliefs, and competencies that uniquely differentiates one professional from another. In our case, the examples are engineers and social workers. Since it is this mentality which appears to be, in and of itself, a driving force--or press--on the individual during his/her career, we begin by asking how and when is it assimilated by the adult learner. This takes us into a review of research concerning college and professional education from the perspective of environmental press on the individual to adapt or develop in particular ways. From this summary issues are raised regarding the definition or boundaries of one's "learning environments" in professional education. Two kinds of environments are selected for further study: courses in formal professional schools and the idiosyncratic definitions of 'significant learning environments'. of the learner. Attempts to measure and understand the former are then reported and discussed. The latter is the focus of Section V-C.

The Culture of Professionalism. The culture of professionalism in America was created by the nineteenth century, mid-Victorian middle class (Bledstein). Eager to establish an identity which was free of European culture and traditions, this group was instrumental in structuring society according to their distinct vision--the vertical view of career paths. Thus, they could improve their worldly lot while offering their services to society. Professionalism became a culture in the sense that it included a set of learned values and responses by which people shaped their emotional needs and measured their powers of intelligence:

> The person who mastered professional discipline and control emerged as an emulated example of leadership. He was self-reliant, independent, ambitious and mentally organized. He structured a life and a career around noble aims and purposes, including the ideal of moral obligation. But most importantly, the professional person absolutely protected his previous autonomy against all assailants, not in the name of an irrational egotism, but in the name of a special grasp of the universe and a special place in it (Bledstein, 1976, pp. 91-92).

In addition to the importance of one's sense of professional autonomy, one of the most positive benefits of professionalism for the individual is the liberation of creativity. To be a professional means more than to have a craft; it means one has a calling and that one is engaged in meaningful, creative work. The early engineers, for example, delighted in thinking of themselves as benefactors or saviors of mankind who, through technical problem solving and innovation, would--literally--bring people closer together (Florman). In fact, engineers felt they were improving the world *by their way of thinking*.

> If engineers could solve problems by being open-minded and free of preconceptions and prejudices--by applying scientific methods--could not all men learn to think in this mode, and then would not ignorance, superstition and bigotry vanish? (Florman, 1976, p. 7)

In contrast, one could reasonably assume that social workers viewed their calling, meaningfulness, or areas for creativity to be in improving the world *by their way of relating* to people in it.

The concept of a distinct craft consciousness, which distinguishes one profession from another, e.g., the engineering way of thinking, is derived from the Marxian idea that forms and content of knowledge relate to the class position of the knower. Veblen (1934) extended this line of thinking from a class perspective to an occupational perspective, and defined occupation as habits of thought and action which affect the development of knowledge, values, attitudes, and character formation. This is the basis of our working definition of *professional mentality*. Next we discuss the professional mentality of engineering as an example of how professional mentality, once assimilated, becomes a source of environmental "press" on the individual who has been professionally educated.

Professional Mentality as a Environmental Press: The Engineering Example. We have defined professional mentality as a distinct cognitive style which structures the patterns of an individual's thoughts and actions. The engineering mentality is shaped by two major factors:

(1) The requirements of practical application for primarily nonlife systems.

(2) The existance of a paradigm (Biglan, 1973).

Each of these will be discussed in turn.

Requirements of practical application for primarily nonlife systems influences engineering attitudes toward time and rationality of action (Bensman and Lilienfeld, 1973). Engineering work incorporates two principle attitudes toward rationality: the scientific and planning attitudes. Each of these attitudes has a different time orientation.

According to the scientific attitude, rationality is derived through a process of step-wide logical analysis. With this attitude, the engineer considers logical alternatives and caluculates relative efficiency. Concepts, methods, and procedures are described in objective and reproducible terms. Time is measured in objective units. While engineering, as it is taught in school, is essentially objective-scientific, the press of engineering work in complex organizations incorporates both the scientific and planning attitudes toward rationality.

With the planning attitude, alternatives are weighted and estimated within recognized constraints. Some constraints are organizational and non-engineering; for instance, with the planning attitude, the engineer may discard some alternatives, not becuase they are inefficient or illogical solutions, but because of other organizational factors, such as economic or market feasibility. Time is measured "subjectively," based on the time frame created for the duration of projects which extent over time.

The scientific-planning attitudes toward rationality dominate the engineering mentality so that other attitudes toward rationality--the natural and artistic attitudes (Bensman and Lilienfeld, 1973), tend to remain non-dominant. For a different professional mentality, however, such as social work, these attitudes (non-dominant to engineers) may well be dominant. With a natural attitude, for instance, one would enter a situation in terms of one's own personal goals and a direct intuitive sense of the situation. With the artistic attitude, one would seek to create an image that could be experienced directly, intuitively, and emotionally.

Existence of a paradigm is the second major factor which affects the cognitive style of the engineering mentality. A paradigm refers to the body of theory about cause and effect which is subscribed to by all members of the field (Kuhn, 1962). The paradigm serves two important organizing functions: It provides a consistent account of most of the phenomena of interest in a particular area; and it defines those problems which require further research. A field such as engineering which has developed from a single paradigm will be characterized by a greater consensus about content and method than other fields which lack a paradigmatic science base (i.e., social work).

This consensus about the content and methods of the field affects the degree and quality of social connectedness among colleagues. The character of the social connectedness of engineers is termed functional by Bialand (1971), with regard to task interdependence. A high degree of functional connectedness is possible because all are working within a given framework or paradigm, thus, parts of projects or reports can be easily relegated among a number of engineers and then fairly easily integrated. Functional connectedness has a 'people are interchangeable parts' connotation which suggests that working relationships should be impersonal, emotionally distant, and task oriented. And, in general, engineers tend to be emotionally unexpressive and lack a variety of interpersonal skills (Florman). We will return to this point later when we consider the implications of this particular working style for the career development of technically-trained professionals (see, in particular, Section V-F).

Over time, professional mentality tends to generate certain internal, psychological dynamics within the person so that members of one profession may be distinguished from other professional groups. It becomes possible, for example, to characterize someone as an engineering "type" on the basis of certain behaviors. In this sense, habits of thought and action become characterological, and so we may think of character and career as two faces of a single phenomenon.

We have begun to establish that the professional mentality in engineering shapes one's cognitive style in certain ways rather than in other ways. We described the cognitive style of the engineering mentality as most affected by the scientific-planning attitudes toward rationality, and by the existence of a paradigm, which facilitates a functional connectedness among colleagues. We will consider how professional mentality may in fact blunt certain capacities of the individual to adapt, relate, and respond--to others and to the environment.

The professional mentality of engineering creates an appreciative context (Vickers, 1968) in which one looks at one's self and regards one's work as an engineer. Once the technically-trained professional joins a work organization, the individual is affected by organization socialization processes as another kind of environmental press. The profession tends to become more distal to the individual as that person becomes socialized to organizational values; and the organization thus becomes more focal than the profession (Schein, 1972). Yet as this point, evidence already exists to suggest the powerful blunting process that the professional mentality has had on the individual's capacities to adapt, relate, and respond to others and to the organization's environment (Sims, Section VI-B).

Where does this powerful "mentality" come from? Just how does professional education contribute to this overarching "press" the professional adapts to and performs from? Our underlying assumption is that the keys to these kinds of questions lie in understanding the environmental press of college environments, particularly those considered part of professional schools or departments. Such distinct differences in professional mentality of social workers and engineers, as evidenced by the varying learning styles already cited in this Report, must result to a large extent from person-environment interactions in professional schools. A major intent of our Professional Schools Study was to develop means to identify and understand the significant environmental presses in professional schools/curriculums. If more is understood about the press of professional education, then we can learn more about P-E interactions in professional education, and thus learn more about where professional mentality comes from and how it is nurtured.

We turn now to a discussion of previous research on college environments from which we can develop and conclude a model of "learning environment" to use in our inquiry.

The Study of Environmental Press in Colleges

The Measure of Press. Perhaps the most influential work in the study of college environments has been the program of research developed by C. Robert Pace and George G. Stern (1958). Building on the conceptual model of Henry Murray (1938), they developed a test for measuring the 'environmental press' (Murray's term) of colleges. This instrument grew out of Stern's earlier attempts to construct a needs inventory based on Murray's classification of needs called the Activities Index. This index consists of 30 scales corresponding to Murray's needs taxonomy. It includes such scales as need for order, need for nurturance, need for play, and so on.

The College Characteristics Index (CCI) consists of an equal number of items (300, 10 to a scale) to which a true-false answer is given. Items were constructed by considering what typical characteristics of college would be satisfying or tend to reinforce an individual with a high need for order, nurturance, play and so on. The items are statements about college life. For example, items on the CCI which would indicate a press for order include: "Faculty members and administration have definite and clearly posted office hours"; "In many classes students have an assigned seat"; "Professors usually take attendance in class." Reliability measures published for the CCI are fair but not great. For example, reliability was computed using the Kuder-Richardson Formula 20. Correlations ranged from a low of .34 to .81 with a mean of .65 for the 30 scales (McFee, 1961). As we review studies of person-environment interaction in colleges, we will often come across studies using the CCI or variants of it.

McFee (1961) set about to discover what effects the personality of students had on the way they answered the CCI. She examined the general relation between the corresponding need (as measured on the Activities Index) and the press measure on the CCI. As well, she studied the relation between each specific CCI item to the corresponding need scale. In her sample of 100 introductory psychology students, she found some low significant relations between needs and ratings of items with "low exposure value." For those items where students lack direct experience and must guess, ones' needs are more likely to influence the answer given. Overall, however, she found no significant relations between the mean scores on the Activities Index and corresponding CCI scales. Pearson product-moment correlations ranged from -.007 to .057 for the 30 scales. These findings are relevant both for issues of measuring "environmental press" and understanding person-environment interaction.

That there was no relation between people's needs and their ratings of environments on each scale as a whole suports the use of environmental rating scales matched to individual characteristics. Obviously, we do not want environmental measures that are biased by individual differences. At the same time, environmental press measures commensurate with measures of individual attributes are necessary to further our understanding of person-environment interaction (see Section V-E). The great majority of person-environment studies only measure one side of the interaction and make assumptions about the other side. This often results in confusion about what is effecting what.

McFee's findings make clear that environmental measures must have "high exposure value" if they are not to be effected by individual characteristics. This suggests that people see their environment in a fairly "objective" way if the stimuli are unambiguous. Environmental measures that attempt to match individual characteristics can be used without fear of bias if the items refer to things or events students are likely to have experienced. This is important to the research reported on later in this section.

Self Selection into College Environments. It is unquestionable that the images students have about the college they have chosen to attend and are just entering are based partly on fantasy, partly on reality. Holland (1958) concluded from a large scale study that even high ability students ". . . select colleges by means of vague notions which they seldom can document meaningfully" (p. 319).

Feldman and Newcomb (1973b) present in tabular form, seven CCI studies of different colleges which compare the expected college environment as rated by freshmen with the "actual" college environment as rated by students already attending the college. In at least five of the seven studies, the average rating of the environment by freshmen was higher than the rating by those in attendance on 80% of the CCI scales. Not only do freshmen images contain a good deal of fantasy, but they also appear to overdramatize the press they will face in college.

Fuzzy and distorted as these images may be, there is much evidence that similar types of students end up at similar institutions. This provides reason to believe that some sort of self selection mechanism is at work.

A major variable here is students' socio-economic backgrounds. A wealth of studies (reported in Feldman and Newcomb, 1973a, Chapter 5) show that students of high socio-economic background (i.e., high family income, highly educated parents) tend to go to more pretigous, private universities while those of low socio-economic backgrounds tend to go to public, two or four year colleges. A second major variables is academic ability. Highly intelligent students are concentrated in a relatively small number of institutions (Feldman and Newcomb, 1973a).

A good number of comparative studies have shown significant differences in attitude and personality characteristics among students entering different kinds of colleges. These studies measure many different things in different ways and so the results are not as clear as for socio-economic background and academic competence. The characteristics and attitudes most studied lump around what we can call political and religious values. For example, after a considerable program of research and collaboration with others, McConnell (1961) found significant differences between National Merit Scholars entering Ivy League schools and other NMS students on orientation to authoritarianism. The Ivy Leaguers tended to be lower on this. From the same data, they found that students entering sectarian colleges are more religious than those entering non-sectarian schools.

In summary, when colleges are grouped according to conventional descriptions like liberal arts vs. technical/professional, private vs. public and religious vs. non-sectarian, three sets of variables help account for student self selection: socio-economic background, academic ability and political-religious values. What differences might we find if schools were grouped according to similarity scross CCI scales?

Both Stern and Pace have examined this question with data from the CCI and from the "College and University Environment Scale," a CCI derivative. Using various statistical techniques for clustering schools, they have consistently arrived at relatively homogenous clusters of schools that can be described more or less by these same conventional (public vs. private, etc.) categories! (Feldman and Newcomb, 1973a).

The Socializing Press. The question arises, do these characteristics of entering freshmen, which distinguish one school from another, disappear as they go through their undergraduate years? Obviously, socio-economic background is fixed. As well, we wouldn't expect differences between individuals in their IQ's to change too drastically. But what of political and religious values? Does a broadening of ideas lead to more liberal or conservative views? More religious or agnostic views? No systematic effect?

Nelson's (1938) study of 18 colleges in the mid-west and south reported mean scores for frehmen,sophomores, juniors and seniors on the Lantz C-R (conservatism-radicalism) Opinionnaire, Form K. The data consistently show seniors as less conversative than freshmen. Thus, college tends to be a "liberalizing" experience. However, there are interesting differences amongst schools. For example, seniors at one particular school have a higher conservatism scores (even after becoming liberalized) than freshmen at any of the other seventeen schools.

This kind of finding is consistent with more recent data in a large number of studies (Feldman and Newcomb, 1973b). Seniors consistently show more liberal political values than entering freshmen. However, variance between colleges is just as interesting. Schools that attract more conservative students produce more conservative individuals than schools which attract liberal students. The gap between these students widens over time.

A similar pattern holds for religious values. Nelson (1940) found that in most instances, seniors had a less favorable attitude toward organized religion or belief in God than freshmen. However, this was not always the case. In a few very sectarian schools, seniors had more favorable attitudes toward religion and the church. Most interesting was the finding that even of those who decrease in favorableness, those who select sectarian schools decrease less in favorableness than those in other schools. These type of findings have been reported in other studies (Feldman and Newcomb, 1973b).

These results, and those on selection of college, lead Feldman and Newcomb (1973a) to posit the existence of an accentuation phenomenon in college life whereby initial differences among groups of freshmen increase over time. Specifically they theorize that there are characteristics of individuals which match characteristics of college environments. Without listing what such characteristics might be, they hypothesize that students tend to select themselves into colleges with matching characteristics. Once in these environments, these characteristics are accentuated so that students graduate from colleges more diverse in those things that differentiate them initially as freshmen: Thus an indication of the blunting effect (or side-effect) of attaining a professional mentality.

The first phenomenon we shall label "self selection" and the second, "socialization." The total cycle of self selection - socialization we will refer to as the accentuation process. As we shall see, this process appears to be going on at various levels of person-environment interaction in college.

The Study of Environmental Press in Disciplines[1]

Accentuation of Values. A comprehensive study by C. W. Huntley (1965) examined the values of 1.027 entering freshmen on the widely used Allport-Vernone-Lindzey Study of Values (AVL). He then readministered the AVL to this same population as seniors. The data combines the scores of six successive classes from the years 1956 to 1965. He divided his sample into nine fields of study (e.g., engineering, social studies, pre-medical, etc.) and analyzed the differences in rank orders between freshmen on the six value sclaes and the gains made between freshmen and senior year among the nine major fields. To illustrate this, one of his tables is reproduced below (Table 5-1). As this table shows, students entering major fields not only tend to be differentiated by economic values but that the changes in this value follow the logic of accentuation. Students in the major with the lowest score on this value in their freshmanyear decrease the most when tested at their senior year. Conversely, students in the major with the highest score on Economic Value are the only ones who actually increase their score. The only other sclae showing a similar significant trend in Huntley's study was "Importance of Aesthetic Value."

Inquiring into the Huntley study, Feldman and Newcomb (1973a) provide further data obtained via personal communication with Huntley. Examining whether change in values might be only an intrpersonal process (i.e., people who are particularly high on a given value make, comparatively speaking, the largest increases on that value, as if the value had a momentum of its own) they look at increases and decreases of individuals' initial highest value. By clustering major fields showing the highest frequency of increase in individuals' intially highest value and comparing the percentage of those increasing on that value versus all other major fields, they find significant differences on four of the AVL sclaes at between the .001 and .005 levels of probability. This, contrasted with the fact that less then one third of all students in the sample increased their initially highest score, lead Feldman and Newcomb to conclude that the degree of "fit" between value and major field is a key element in accentuation of values.

Measuring the Press of Major Fields. Attempts to use the CCI to measure the press of different academic departments or major fields in colleges have failed to discriminate between the press in a major field and the college as a whole. Pace (1964) reports on study where an entire senior class was tested and divided into 15 academic sub-groups. In 11 of these groups, no mean score on any of the 30 scales differed from the mean of the total sample by as much

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[1] Numerous studies indicate major differences among the populations who choose to major in different discipliens along two variables: socio - economic background and sex. As there is relatively little effect socialization processes may have on these two variables, we will take them as givens and move on

TABLE 5-1

Importance of Economic Values
Over the Span of College*

major	Freshmen $\bar{X}$ score	Fr→ Senior gain	rank of Fr score	rank of Fr→ Sr gain
INDUSTRIAL ADMIN.	47.11	+1.96	1	1
ENGINEERING	45.56	-1.08	2	3
SOCIAL STUDIES	43.99	-0.20	3	2
CHEMISTRY	43.31	-3.92	4	6
SCIENCE	42.09	-1.79	5	4
PREMED (SCIENCE)	40.56	-3.68	6	5
HUMANITIES	39.99	-4.22	7	7
PHYSICS	38.95	-4.32	8	8
PREMED (ARTS)	36.11	-4.89	9	9

rho= +.93
$p < .01$ (1 and 2 tailed tests)

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[*] Source: C. W. Huntley (1965) Rank order of mean freshmen scores compared to rank order of freshmen-to-senior gain for Importance of Economic Value.

as 1 point (out of a possible range of 10). Assuming that differences between major fields do exist, Pace attempted to develop an instrument that would be more sensitive to such differences; the College Characteristics Analysis (CCA).

The CCA evolved out of his factor analysis of the CCI. He hypothesized four different directions of influence or emphases which constitute the four CCA press measures: 1) intellectual, humanistic, aesthetic, 2) friendly, group-welfare, 3) scientism, independence, 4) practical, status.

To test the relative influence among different environments, the instrument also contains three structural categories or sources of influence: administrative procedures, major field and student peer group. Each scale contains 15 statements relating to administrative procedures, 15 for major field and 15 for peer group. The total then is 45 items per press measure of scale, 180 items in all.

In order to assess the relative effects of press on student accomplishment toward educational objectives, he administered a questionnaire to respondents asking them to rate their self-perceived progress toward nine educational objectives on a four point scale. The relations he hypothesized between press and accomplishment were as follows (Pace, 1964, pp. 25-26):

Press Measure	Educational Objective
intellecutal, humanistic, aesthetic (IHA)	- acquring a broad cultural and literary education - understanding different philosophies and ways of life - developing an enjoyment and appreciation of art, music and literature
friendly, group-welfare (FGW)	- social development, getting along with others - effective citizenship
scientism, independent (SI)	- specialization for further professional, scientific or scholarly work - critical thinking - understanding science and technology
practical, status (PS)	- vocational training

Using a sample of 1,319 students from nine different colleges, correlations between press and progress toward objectives were all low but in the hypothesized direction (IHA=.32, FGW=.27, SI=.20, PS=.15).

To assess the differences among different major fields, mean press scores in major fields were compared to the score for the whole college and significant differences were looked for. There were some characteristic trends. On the whole, engineering, business and nursing tended to be higher on PS. The natural sciences tended to be higher on SI. Nursing and Education tended to be higher on FGW while those in social sciences and the humanities did not deviate from the total college press to any significant extent on any scale. Here is indication of the developing professional mentalities in different disciplines.

Deviating subgroups (that is, students in a common major field whose press ratings were significantly different from those obtained from all students in that college) were more frequent in larger as opposed to smaller schools. But the most significant finding of all was that ". . . the atmosphere of the college as a whole, even in the case of the largest or most complex colleges, is dominant. Even if the number of deviating subgroups was twice as great as the present study has revealed, there would still remain a large majority whose characteristics were not significantly different from the college as a whole" (Pace, 1964, p. 207). Whatever major field was studied, press measures were characteristic of the particular college in which they were located and showed no significant relation across colleges. This finding is puzzling in light of the strong evidence suggesting that major fields of study are inherently different.

That major fields are different has been established in a number of studies. Biglan (1973) uncovered systematic differences between major fields as reported by scholars at two universities along three dimensions: degree of paradigm, degree of concern with application and concern with life systems. Kolb and Goldman (1973) uncovered systematic differences among a large sample of graduate students and practicing managers in their undergraduate major by their learning styles. People with similar learning styles tended to come from similar undergraduate major fields.

This suggests two conclusions: (1) that learning style and the "learning environment" may be a more useful heuristic for examining different environments within college; and (2) that examination of learning environments in graduate-level programs, or junior-senior level, may capture more of the differential effects of the press from professional mentality vs. from the college as a whole.

Other Impacts on the College Experience

Living Arrangements. Upon surveying a large number of studies on the effects of peer groups and residence grouping on college students, Feldman and Newcomb (1973a) state, "The difference among members in several types of living quarters that have been discovered are in large part consequences of the forces of selection and group recruitment" (p. 223). They also contend, admittedly with less evidence, that these living arrangements have ongoing impacts in the form of producing attitude change or reinforcing existing orientations. One would expect that it would be particularly so in living quarters, with high amounts of face to face interaction, that forces of socialization would be strongest for students (Berger and Luckman, 1966).

Impacts of Faculty. Don Thistlewaite has done a number of studies on what affects student aspirations. In one study (1959), he observed that a number of the items on the CCI describe faculty behavior. In order to assess if it is the faculty or student subculture responsible for this results, he divided the items into those describing student activities and those describing faculty and administrator activities. He found that colleges which had the most students who went on to pursue graduate study consistently rated high on his "Informality and Warmth of Student-Faculty Contacts" scale, regardless of the student's major field.

In a follow-up study (1960), Thistlethwaite found that increased motivation for students in arts, social sciences and humanities to seek advanced degrees was related to 1) high degree of faculty enthusiasm, 2) faculty affiliation with students, 3) faculty pressure on students to achieve, 4) encouragement of independence, and 5) encouragement of humanism.

A number of studies have faculty members cited by students as important influences in career or graduate school decisions (Feldman and Newcomb, 1973a). While the accentuation process is not so clear here (e.g., in what ways do students self select faculty), it is clear that faculty members can constitute an important part of the college environment of students and that they can have an impact.

On the Definition and Boundaries of Learning Environments. The relevant literature on the assessment of environmental press in professional education fails to agree on just what is termed the environment. It suggests, rather, that those external forces, or stimuli, that contribute to molding one's values, attitudes, skills, and, of particular importance here, one's professional mentality come from things as large as an overall college's image or policy to a particular course, to one's individual relationship with a faculty member or peers. This fits Bronfenbrenner's (1977) notion of the individual's embeddedness in an ecological environment that is really a space of nested sub-environments ranging from the immediate interpersonal, task, and physiological setting (the micro-system) to the meso-, exo-, and macro-systems which entails ideologies and overarching cultural values, beliefs and ethics.

To understand person-environment interactions in professional education that result in accentuation of competencies associated with one's professional mentality, we are most interested with subjective apprehensions and evaluations of what the learners keys on, responds to, develops from, i.e., how their environments are perceived and experienced (Pervin, 1968; Stern, 1970).

Further, as McFee (1961) has argued, we need to identify "high exposure, objective, environmental phenomena" if we are to make generalizable inferences about what impacts on large populations of learners. Given this, we are concerned with developing methods and tools to understand the learner's micro and meso level environments. Our working definition of one's learning environment is then oriented more toward the level of relationships and courses than overall college climate or sociological factors.

Specifically, our Professional Schools Study has attempted to further our understanding of the impact of courses in professional education and the individual learner's idiosyncratic concept of "significant learning environments" on the development and accentuation of adaptive competencies related to one's professional mentality. These two foci are warranted given the results of our survey of graduating social work and engineering students (see Section III-B). In that survey, respondants were asked in open-ended questions to identify the type of learning environment, experience, or event that they felt contributed to each of four types of adaptive competence: four ways of handling situations that can be associated with professional cultures. The 59 respondants offered 196 responses. Of this total, 139 (71%) were identification of specific courses or assignments in courses as having been the 'environment' where they either 'developed or had to utilize' the particular competence or style. Of the 57 non-course responses, 48 (84%) had to do with relationships with faculty outside of formal courses, relationships with those one lived with, or relationships with those in one's work (including work-study or field placement) outside of formal coursework. While selective perception may have operated on the subjects via a "survey of professional schools," Bushe (see Section V-C) found courses still to be relevant in his panel study of eighteen students. Of the 85 "significant learning environments" they identified 52 (61%) were formal courses.

The remainder of this paper discusses the development of a tool to assess course environments in ways to help us understand the accentuation of professional mentality discussed earlier. The next Section (V-C) will address the idiosyncratic context of learning environment: how one chooses what is a 'significant learning environment'; and how this choice is related to the accentuation of professional mentality discussed earlier.

The Measurement of Environmental Press in Courses. Kolb and Fry (1975) have posited that most any notion of environment in Lewin's B = f(P,E) paradigm can be viewed as a learning environment. Therefore the concept of person-environment interaction is one of learning and all that entails: responding, adapting, acting, changing, developing, and so on. Much of the previous research reported here has focused on the person in Lewin's formula (i.e., learning style, adaptive style, competency profile, adult growth and development in the context of careers). Kolb and Fry's notions about the environmental side of the formula provide us with the potential to view the environment in terms similar to how we are viewing the person. They have hypothesized that a learning environment can be characterized in terms of four orientations or distinct types of "press" that pose demands upon the person/learner in that environment. The four orientation have been labelled Affective, Symbolic, Perceptual, and Behavior. These terms are arbitrary, but connote a hypothesized relationship between the type of "press" experienced by the person and the type of learning competencies from Experiential Learning Theory (see Section II) required of that person to interact successfully or effectively with the environment. Affectively oriented environments are thought to require Concrete Experiencing learning skills and predispositions. Perceptually oriented environment would exhibit a press for Reflective Observation competencies. Symbolically oriented environments would press for Abstract Conceptualization modes of learning and, finally, the Behaviorally oriented situation would press for Active Experimentation. Some general prepositions about these four orientations in the context of course environments are described below:

An Affectively Oriented Environment. This is characterized by activities or tasks aimed at helping learners to realize and develop their personal attitudes toward the field or profession; information generated from the "here and now" feelings, opinions, and values of the learners; procedures and guidlines oriented to facilitate the free expression of personal needs, wants, and feelings; teachers functioning as friendly listeners and counselors; and personalized, immediate feedback to the learner.

An example might be a classroom debate on abortion in a political science course, where the participants must put themselves in a position to express and argue positions that will highlight their personal feelings and values toward the topic. Discussion after the debate is geared to critiquing the debaters' handling of themselves in that specific situation.

A Perceptually Oriented Environment. This is characterized by activites aimed primarily at understanding a concept or relationship between events, information sharing focused on how or why things occur or relate, methods that encourage the learner to try out new perspectives or ways of thinking about a subject, teachers who serve to direct and bound discussions, and learners who learn to use professional or discipline-based standards to evaluate performance or judgments.

An example might be a recitation section in a U.S. history course where the class is asked to discuss and analyze a recent presidential State of the Union address from the perspective of different historians. The discussion has no right solution or predetermined end point, but the instructor serves to referee tangential commentary and to clarify how certain theoriests may have viewed the address.

A Symbolically Oriented Environment. This would be characterized by activities oriented toward mastering a skill or concept by using it to solve a problem; information primarily based on abstract, "there and then," and objective data; learners being forced to use terms, rules of inference, protocols, and memory recall to communicate about the topic; the teacher functioning as the interpreter of a field of knowledge and a guide to direct the learner in the manipulation of terms, symbols, concepts, and so on; and learner output evaluated as correct or incorrect by objective criteria from axioms or rules in the field of study.

An example might be a lecture on the industrial revolution, where the learner must be able to conceptualize relationships among social, political, and technological forces, or an oral test in a French class where the learner is right or wrong and must rely on recall, rules, and terminology in order to answer.

An Behaviorally Oriented Environment. This is characterized by activities designed to have the learner apply knowledge and skills to solve real-life problems as a professional would; information sharing centered on what is necessary to plan, schedule, write, prepare presentations, and so on to get a task finished; learner autonomy, or minimal rules or guides that force learners to take responsibility for their action; teachers serving as coaches who guide by offering friendly advice based on personal experience but leave responsibility for the outcome to the learner; and learners left to judge their own performance by using professional critieria they accept as valid.

An example might be a term project in an experimental psychology course to design and conduct an experiment based on a topic or another experiment studied in the course. The learner is then asked to write up the results and evaluate their merits.*

Learning environments can vary in the degress to which they are oriented to any of the four areas above. Fry (1978) has validated this in a study of a landscape architecture department where he developed an observational instrument to measure the environmental complexity of ten different courses. The results indicated that all courses had degrees of orientation in each area, but that most had, like learners, biases or predominant orientations. Fry's exploratory study also gave support to a particular set of focal or figural elements in a course environment that constitute sources of "press" on the learner. These were drawn from the work of Joyce and Weil (1972) who surveyed and typologized educational pedagogy. From their work, Fry posited that there were five important sources of press in a course environment. These were:

(1) Nature of primary activity (task)
(2) Primary source of information
(3) Rules guiding learner behavior
(4) Teacher role
(5) Potential for feedback

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* Fry and Kolb, 1980, pp. 82-83.

In each of the above areas, scales were developed to measure an affective, perceptual, symbolic, or behavioral manifestation of these factors.

In the current inquiry, Fry's original 21 item observation instrument was adapted and used in five target courses. These courses were chosen for the following reasons:

(1) Instructor willingness to allow observers in;

(2) Required courses, thought by faculty advisory groups to our study to be key in formation of professional identity.

The courses included three methods courses in social work, one in an administrative major and the others in a direct service major track. The two engineering courses were a methods course for mechanical engineers and a systems course for electronic engineers (see III-B for more details). Each course was observed a minimum of four times by a panel of trained observers. In addition to observations all enrolled students in each course were surveyed at the end of the term under study and some members were interviewed in depth periodically during the terms as part of another study (Section III-B) reported on in Section V-C.

The Assessment Instrument. Based on Fry's (1978) results and recommendations for alternations, a 20 item observer instrument was designed and pre-tested until the observer panel could reach concurrance within one point on a seven point scale, 80% of the time (16 of 20 measures). The complete instrument is exhibited in Appendix G. Below are the scale questions corresponding to the four orientations.

Affective Items:

To what degree is the emphasis on helping the learner to realize or develop his/her attitudes toward the profession, field of study, or task at hand?

To what degree is the source of information being dealt with "here and now," focusing on personal feelings/statements at the moment?

To what degree do learners express personal opinions about or reactions to course activities or to a topic (e.g., expression of attitudes, values, aesthetic concern; evaluation of others' evaluation of content or process--"I think, I feel that, I want to. . .")?

How often does the instructor act as a listerner, helper, or counsellor to the learner (particularly in one-on-one relationships?

To what extent are critieria and standards based on self and others' experience of self at the moment (e.g., personalized disclosure and feedback to ascertain quality of performance)?

Symbolic Items:

To what degree is the emphasis of learning a skill or concept by using it to solve a problem?

To what degree is the source of information abstract of "there and then" (e.g., discussing methods, concepts; looking at pictures, graphs of a site; reading or listening about something done in the past)?

To what degree are activities and communications constrained/governed by rules of inference, jargon, methods, symbols: could a stranger understand what was going on? (e.g., is it necessary for learners to memorize terms, labels, codes, data for recall; use complex graphical keys; adhere to guidelines, schedules, etc.)?

How often does the instructor use his/her expertise to interpret a body of knowledge for the learner and/or to guide the learner in use or terms, rules, protocols, etc.?

To what degree is performance or decisions by the learner evaluated as correct or incorrect by objective criteria based on axioms or rules of the field of knowledge?

Perceptual Items:

To what degree is the emphasis to derive or understand a concept of relationship between concepts or events?

To what degree is the focus of discussion or interaction on "how" or "why" things occur or relate to one another (e.g., analyzing events)?

To what degree are learners encouraged to observe, listen, reflect and discuss in order to try out new perspectives or ways of thinking about a subject?

How often does the instructor act as a listener, helper, or counsellor to the learner (particularly in one-on-one relationships)?

To what degree is the learner encouraged to see or generate alternative standards or criteria of the discipline to evaluate meaningfulness of his/her performance?

Behavioral Items:

To what degree is the emphasis on applying knowledge or skills to solve real life problems in ways a professional would?

To what degree is the focus of discussion or interaction on that necessary to organize, plan, schedule, or otherwise accomplish a task with an outcome or product?

To what degree is the learner left to make decisions about his/her own behavior: most behavior is dependent upon previous decisions/choices s/he has made?

How often is the instructor a "coach" who guides by offering advice/reactions based on personal experience as a professional?

To what degree is the learner left to judge or evaluate performance for him/herself using critiera s/he chooses as valid?

The Courses. Engineering Systems Course (N=19) - This course met twice per week for 75 minutes. The instructor was the author of the primary text. There were problem sets to be completed weekly and two exams given. Class time was spent either going over problem solutions (by students going to the board to illustrate correct methods) or by the instructor outlining major points and formulas in assigned reading (via slide projections of text and figures).

Engineering Methods Course (N=25) - This course met three times per week for 50 minutes each. Nearly all class sessions were lectures involving derivation of mathematical formulae and operations. Weekly problem sets were assigned and there were three exams. A computer lab was also part of the course. Students had 4-6 week periods in which to complete a self-directed study problem to demonstrate the application of the mathematics to some practical problem represented by data hold in the computer.

Social Work Methods - I (N=16) - This course met once per week for 3-4 hours. Each class consisted of lectures, paper and pencil exercises, discussion, Q/A periods and, on rare occasion, experiential exercises. Readings were assigned weekly. Other assignments and a term project paper were connected to each students field placement. All placements were in administrative roles and the content covered in the course centered around basic administration of social services.

Social Work Methods - II (N=13) - This course met once per week for 2-3 hours. Most class time was spent in case analysis or in discussing cases from each student's placement. Certain basic protocols and techniques (i.e., interviewing) were covered by the teacher in lecture-discussions. All placements were in direct, client-service roles.

Social Work Methods - III (N=16) - This is another section of the above methods course, also in the direct service area. The only major difference is in the instructor's interest in psychodrama. He tends to make the classroom more interpersonal and experiential versus lecturing from notes.

Corraborating Data. In order to begin to validate our concepts of learning environments and our measurement tool, we surveyed students in each target course to collect data on the following:

a) Self-perception of Environmental Press - each student was asked to indicate the extent to which the course required each of 27 competencies in order to succeed in the course. This list was developed from the Work Abilities Index from the Alumni Study. The list is shown in Appendix H.

b) Environmental Press Paragraph Rankings - each student was asked to rank order four paragraphs according to which one most described the course. Each paragraph was designed to be correlated with a "pure" orientation in the affective, perceptual, symbolic, or behavioral area. These paragraphs are shown in Appendix I.

c) Learning Style - each student completed Kolb's Learning Style Inventory (see eariler Appendices for Section II).

Results.

Student Perceptions of Environmental Press. Table 5-2 indicates the resulting rankings of the Paragraph Ranking question. While there was not unanimous consensus in each case, there was clear consensus on the most dominant orientation in each course. The two engineering courses were perceived to be similarly oriented toward a symbolic and perceptual press. This is an expected result, given that the predominant engineering learning style is Convergent, or abstract-active. If the environments of courses were shaping such a style, then we would predict those environments to be symbolically and behaviorally oriented.

In the social work courses, the students had similar perceptions of the two methods courses in the direct service track. The learners in the administrative methods course, however, saw their course differently. These results again hold true to our expectations. In the direct service courses, the press is perceived as behavioral-affective, corresponding to the Accommodative (active-concrete) learner style; what we find as a predominant style in our social work alumni (see III-A). The Perceptual-Behavioral orientation of the Methods-I course is intriguing. Such a press would suggest that the learner is being asked to be active-experimental and reflective at the same time! While both are being asked (reflect in discussions, reading, writing and act in field projects and class discussions) it is less likely one is developing or using both competencies at once to adapt to the press suggested by this data. In essence, this result reflects the dilemma of the course: how to instruct on administration via theory or trial and error or both.

TABLE 5-2

Student Ranking of Environmental Press Orientation

Environmental Orientation	Course Engr. Systems (19)	Engr. Methods (23)	Social Wk. Methods I (16)	Social Wk. Methods II (13)	Social Wk. Methods III (16)
Affective	7* (17)**	5 (13)	19 (18)	31 (26)	38 (31)
Perceptual	18 (24)	16 (28)	31 (43)	23 (26)	6 (22)
Symbolic	57 (40)	53 (39)	19 (12)	23 (13)	12 (16)
Behavioral	18 (19)	26 (20)	31 (27)	23 (35)	44 (31)
Rank Order of Orientation:					
1 - most	S	S	P	B	B
2 -	P	P	B	A	A
3 -	B	B	A	P	P
4 - least	A	A	S	S	S

* Percent of total respondents in course ranking that orientation most characteristic.

** Percent of total responses in course ranking that orientation most or second most characteristic.

To check if the perceptual consensus was biased by learning style, cross-tabulations were run between rank order of paragraphs and hi vs. lo score in the learning style predicted to match that orientation. For example, the class sample was split into hi and lo concrete learners and then their rankings of the Affective Orientation paragraph were compared (i.e., a 2 x 4 table: Hi and Lo CE score by 1,2,3 or 4 ranking). In twenty tables (four for each course) no Chi Square statistics approached significance. It was concluded that a bias does not exist in this methodology: that the learner can "objectively" rate the environment using the cues presented in the paragraph.

Observer Ratings of Environmental Press. Table 5-3 indicates the observer ratings of the five courses and compares them with the student perceptions. In three of five cases there is total agreement: using the observational instrument periodically during the term resulted in identical rank orders to the consensual ranking of the students.

In two of the Methods courses, the observer and student consensus disagreed. In Methods - I (Administrative track) there was agreement on the most prevalent press (Perceptual) and least prevalent (Affective) only. In the Methods - II course, there was agreement only on the least apparent press (Symbolic). The table indicates that in the students' case, three orientations were viewed as nearly equal, and in the observer's scale, normalized totals indicate that they also saw some of the orientations as being relatively the same in strength.

Discussion. These preliminary results show promise for our continued efforts to understand environmental press in courses. First, APSB constructs appear to meaningfully differentiate course "press" in directions one would predict. The engineering course press for convergent competencies and the social work (direct service) courses press for more accommodative competencies. The administrative social work course appears more as a hybrid, trying to develop both active-experimentation and reflective competencies. The scale scores from the observation instrument (in Table 5-3) show trends that suggest we are tapping into the kind of "press" that does develop different professional mentalities. The scores for symbolic and perceptual orientation in the engineering courses are consistently lower (more powerful) than in any of the social work courses. The opposite holds for affective and behavioral orientation scores where they are consistently stronger (lower) in the social work courses. In social work, the less individually, client-centered, interaction-oriented administrative course is the one with the least affective and behavioral orientation of the three, and the greatest in symbolic-perceptual orientation (i.e., it is most like the engineering courses).

Some of these trends are supported in qualitative data obtained in a separate survey of graduating students from these two programs cited earlier. When asked to respond to the same four APSB Paragraphs in terms of "what kind of learning environment required or helped you to exhibit this orientation,"

TABLE 5-3

Comparisons of Student and Observer Ratings of Course Press

Course	Student Rank most ↓ least	Observer Rank most ↓ least	Agreement
Engr. Systems	S P B A	S 5.6* P 8.5 B 14.4 A 18.7	Match
Engr. Methods	S P B A	S 5.6 P 10.6 B 15.0 A 18.6	Match
SW Methods I	P B S A	P 6.6 S 11.8 B 12.5 A 17.0	Match in dominant orientation only
SW Methods II	B A P S	P 7.5 B 13.0 A 13.5 S 13.5	Mismatch
SW Methods III	B A P S	B 8.0 A 10.5 P 12.0 S 15.0	Match

A = Affective P = Perceptual S = Symbolic B = Behavioral

* Normalized rank-order scores from Observer instrument

several trends emerged in the responses:

a) In social work, Methods courses were cited as having contributed to a Concrete Experiencing orientation and to an Active Experimentation orientation (Affective and Behavioral press). Under the Reflective orientation, the administrative methods course was the only such course to be cited as "giving a chance to think about different ways to go about something."

b) In engineering, neither of our two target courses were mentioned by name, but of all the times courses were cited as significant learning events (48%), 73% of those citations were listed under the Abstract Conceptualizing and Reflective Observation paragraphs (corresponding to Symbolic and Perceptual press).

Engineering courses were considered to have contributed to Experimenting and Experiencing competencies in only 27% of the cases where courses were mentioned.

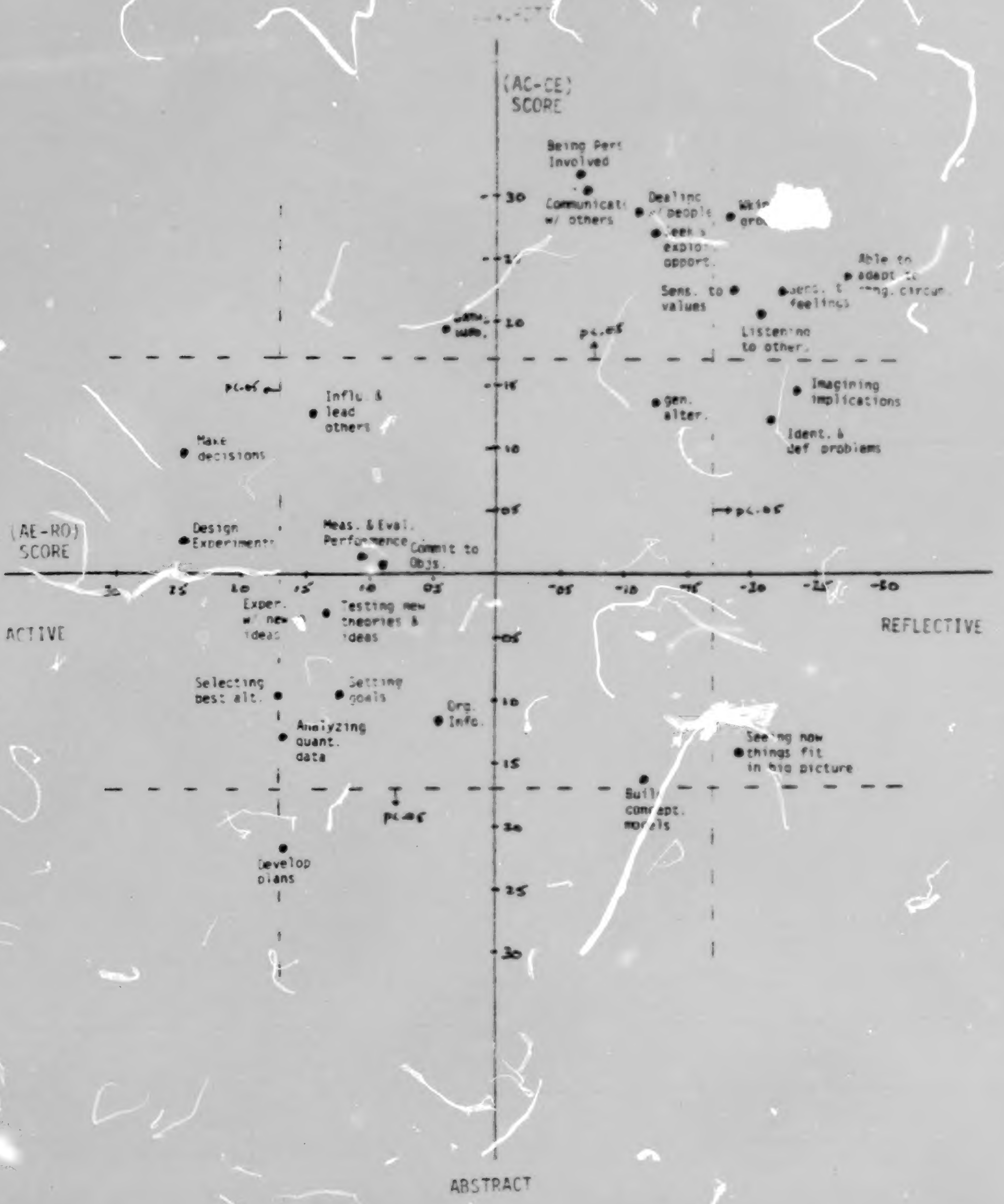
The role courses play (and do not play) in developing one's professional mentality begins to emerge from these analyses. Clearly, if our engineers are getting developed in CE and AE learning competencies, it is not happening in response to typical course environments, if our target courses are in any way representative. Further, if these required courses are typical. and if the students view them as significant environments, then they are perhaps becoming "overdeveloped" in RO and AC learning competencies so much so that developing alternate competencies later on to respond to more affective/behavioral environments may be very difficult.

On the Meaning of Press in Courses. In addition to describing the effect of courses on competency development, it would be desirable to be able to change the press--and thus the interaction effect--in courses if one did desire for certain competencies to be developed or enhanced via the course. The constructs and methods being explored herein hold promise for such efforts in the future.

To demonstrate this, we first looked at the relationship between self-perceived competence and learning style, as was done in the Alumni Study (IV-C). We correlated the learning styles of our graduate student sample with their responses to the Adaptive Competence Profile (Appendix J). The results are shown in Figure 5-1. While not identical to the Alumni pattern, there is a significant amount of similar relationships between items and spacially in the overall grid. As might be predicted of students just finishing intensive school work, there is a reflective bias, or overall clockwise rotation of many items from the Alumni plot. Hence concrete items for people out in careers (dealing with people, listening, being sensitive to feelings) are concrete but also reflective to these entering professionals. Not being forced to act all the time, they have had the "luxury" to think (reflect) more in school.

FIGURE 5-1

Correlations Among Work Abilities and Learning Styles (SASS and [illegible] Graduates; N=5[illegible])



The most striking implication of Figure 5-1 for our inquiry is the lack of clustering of certain competencies. If one were to consider any of the ten most used problem-solving models, it would probably contain items like "defining the problem, setting objectives, generating alternatives, imaging consequences, deciding, implementing, and evaluating." In Figure 5-1 these kinds of competencies cluster around distinctly opposite learning modes. Generating alternatives, imaging implications, defining problems, modelling, etc. cluster in the reflective competency area (and even they vary by degree of concreteness vs. abstractness) while other essential ingrediants to problem-solving like selecting the best alternative fall in the active experimentation field. The same appears around decision making. While mostly active-oriented, there is a division between concrete competencies (making the decision, leading, commiting to objectives) and abstract ones (organizing information, planning, setting goals). This data implies that if a learner is predominantly oriented to one mode (style) of learning over another, then s/he will have strengths and weaknesses in performing effective problem solving or decision making.

What has this to do with environmental press? Most professional educators would admit to being in the business of training "decision makers" or "problem solvers." But if environmental press is oriented in differing degrees to require or enhance the competencies shown in Figure 5-1 then we can begin to predict what strengths and weaknesses will emerge from the P-E interactions in the course. If, for example, our engineers were to take all courses like our target courses, oriented symbolically and perceptually, would they emerge as effective problem solvers? Or would their professional mentality foster a self image that they are problem-solvers when they only have developed some, but not all of the competencies necessary?

To understand more about how students experienced their environments in these terms, we factor and cluster analyzed the Environmental Press Questionniare (Appendix K) for the engineers in our two target courses. The resulting factors are arbitrary, but closely follow the results of a VARIMAX factoring. Table 5-4 indicates the major groupings underlying engineering students' perceptions of the press in the two target courses.

When these factors representing the learners' subjective mapping of their environments are superimposed on the previous plot of self-perceived competencies, the resulting diagram is shown in Figure 5-2. As expected, "decision making" or "problem solving" competencies do not cluster together. Learner's experience their environments as being split. Unless a course is both Perceptually (i.e., requiring reflective adaptation) and Behaviorally (i.e., active adaptation) oriented, the full range of problem-solving competencies are not being cultivated. Using these factors, we created factor scores for the two target engineering courses using mean responses on the Environmental Press Questionnaire. We expected that, as shown in the Figure, certain factors would relate to our APSB constructs, and thus be scored according to the strength of that press orienta-

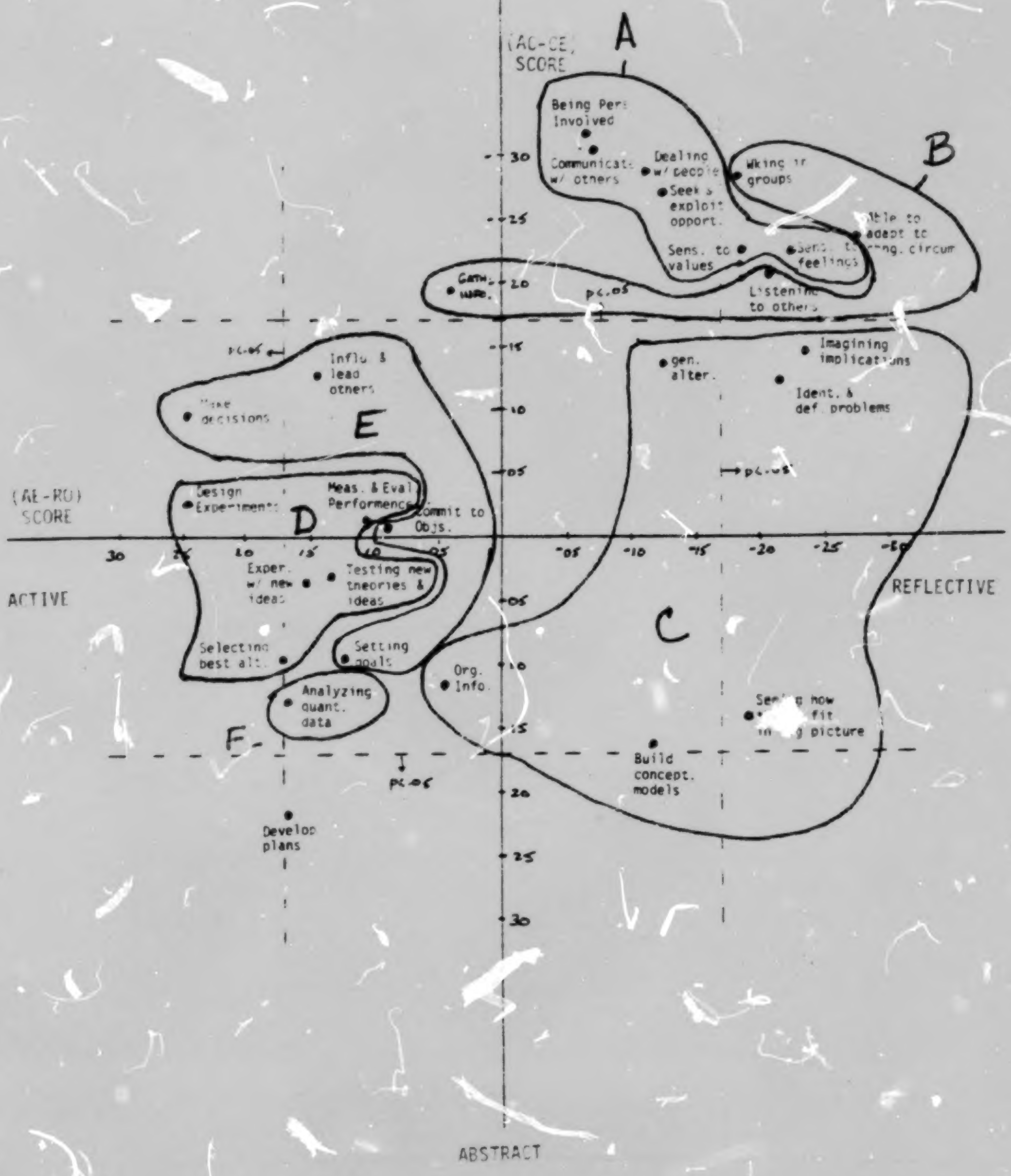
TABLE 5-4

Environmental Press Factors
(Engineering Students in Target Courses, N=44)

Factor	Competencies Being Required by Course
A. Personal Engagement/ Empathy	Being Sensitive to Values
	Dealing with People
	Seeking and Exploiting Opportunities
	Communicating with Others
	Being Sensitive to People's Feelings
	Being Personally Involved
B. Interpersonal Flexibility	Listening with an Open Mind
	Able to Adapt to Changing Circumstances
	Gathering Information
	Working in Groups
C. Conceptual Problem Solving	Building Conceptual Models
	Generating Alternative Ways of Doing Things
	Imaging Implications of Ambiguous Situations
	Identifying and Defining Problems
	Seeing How Things Fit in the Big Picture
	Organizing Information
D. Empirical/Applied Problem Solving	Designing Experiments
	Experimenting with New Ideas
	Testing Theories and Ideas
	Measuring and Evaluating Performance
	Choosing the Best Solution From Alternatives
E. Personal Choice-making/ Risk-taking	Developiong Plans
	Commiting to Objectives
	Influencing and Leading Others
	Making Decision
	Setting Goals
F. Data Analysis	Analyzing Quantitative Data

FIGURE 5-2

Relationship Between Engineering Course Press Factors and Adaptive Competencies in Professional Education



tion. Our hypotheses were as follows:

Factor A	Affective
B	Affective-Perceptual
C	Perceptual-Symbolic
D	Behavioral-Symbolic
E	Behavioral
F	Symbolic

Recalling that both engineering target courses were assessed to be oriented in order of Symbolic, Perceptual, Behavioral and Affective press, the results in Table 5-5 show that we were measuring just what learners were experiencing. The factors receiving the highest scores (most necessary to exhibit in order to succeed in course) were, in both cases, Conceptual Problem-Solving which we expected to correlate with a high Perceptual-Symbolic press. Data analysis (Symbolic) and Interpersonal Flexibility (Perceptual-Affective) were next highest in the systems course. Empirical problem-solving and Interpersonal Flexibility were the next highest in the methods course, both again relating to Perceptual and Symbolic presses as core orientations. The least potent factor in both cases corresponds with the least observed or perceived press on the APSB paragraph rankings: the Personal Engagement factor which was expected to correlate with an Affective press.

Thus through this methodology we can begin to understand what aspects of course environments create which types of environmental press, and finally how professional competencies are likely to be affected in that setting. Although our results are preliminary and represent small, pilot samples, the APSB constructs, in addition to our observation instrument allow us to trace course activities, data source, teacher behavior, norms for student behavior, and types of feedback to perceived press by the learner to the use (and non-use) of adaptive competencies to implications for the "molding" of one's professional mentality. Our models also begin to help us understand the collective impact of course environments on a student population. Using the tools developed here, one could assess the curriculum of a professional school to determine if the overall press is desirable, balanced, skewed properly, etc. Also, one could then raise the question as to whether or not environments other than courses should be created, offered, or encouraged to help develop those adaptive competencies that are just not feasible in typical course settings.

Summary. In this section we have discussed our pilot efforts to conceive and measure course environments in professional education to better understand if and how they foster the development of one's professional mentality. Adapting Fry's (1978) constructs of Affective, Perceptual, Symbolic, and Behavioral press, give target courses were assessed. Observer ratings were contrasted to student perceptions. In general, the APSB framework was shown to be a useful way to compare and contrast courses in terms of professional mentalities being developed, i.e., social work courses were more behaviorally

TABLE 5-5

Mean Factor Scores for Engineering Target Courses

	Course	
Factors:	Engr. Systems	Engr. Methods
Personal Engagement/ Empathy	3.39	3.73
Interpersonal Flexibility	4.55	4.7
Concept. P.S.	5.40	5.35
Empirical/ Applied P.S.	4.2	4.7
Personal Choice/ Risk Taking	4.40	4.23
Data Analysis	5.1	4.6

and affectively oriented - as are the alumni social workers - than the engineering alumni and engineering courses which were more symbolic and perceptually oriented. Student perceptions of environmental press were factor analyzed and found to be clustered in predictable patterns in accordance with the APSB model of environmental press.

More important, however, we are encouraged that our initial steps seem to move us closer to being able to measure learning environments in a way commensurate with how we have assessed the learner and various professional, adaptive competencies s/he develops over time. It is clear more research is to be done before some of the implications here can be generalized, but the proper frameworks in which to conduct that research appear to be in our hands.

C. Toward an Understanding of Accentuation of Learning Style in College: The Relationship of Goals and Learning Styles to the Choice of Significant Learning Environments

Gervase Bushe

Introduction. In their comprehensive review of the literature on the impact of college on students, Feldman and Newcomb (1973a, 1973b) suggest that the most striking principle that consistently emerges is the tendency of initial differences in characteristics among groups of students entering different learning environments to increase over time. They suggest that individuals high on any given characteristic tend to be selected into, and select themselves into, learning environments which nurtures that characteristic. In these environments, those same characteristics are reinforced such that they become even more prominent. For instance, students initially high on liberal political values will be attracted to learning environments which prize such values. Through the socializing press of that environment, they become even more politically liberal. The difference between this group of students and other students will be greater at the end of college than it was at the beginning.

In his studies of learning styles, Kolb suggests that this same process of "accentuation" is taking place (Kolb and Fry, 1975). Using "major field" or "discipline" as the level of environmental domain, he hypothesizes that students are attracted to and self-select themselves into those environments where the learning press is commensurate with their learning style. This press, in turn, further accentuates that learning style.

The data Kolb uses as the basis for these propositions rests on two types of findings. One is the discovery that individuals who have pursued similar undergraduate majors tend to have similar learning styles. The second is the finding that individuals with learning styles commensurate with the hypothesized learning press of their major tend to be more content with their major and intend to pursue a career of graduate study closely aligned with their major.

This study takes up Kolb's notion of accentuation of learning style and focuses in on the self-selection of students into learning environments in college. In particular, we will look at those environments students consider most important and the relation between learning style and learning press in those environments. As will become clear in later discussion, our intent is to understand the accentuation process brought about through person-environment interaction, from the perspective of the person, not the environment. Virtually all studies of P-E interaction in college settings have been environmental in perspective.

Some have attempted to measure learning environments in and of themselves along predetermined dimensions from student responses to surveys. Typically, mean scores from students in one environment are compared against responses from students in other environments in a search for characteristic differences between environments. In a majority of studies, these environmental dimensions are assumed to be commensurate with different individual characteristics.

A second kind of study focuses on different individual characteristics between groups of students. The characteristics studied range from values and attitudes, skills and abilities to personality traits. Typically, mean scores from students grouped by some definition of environment (e.g., the college as a whole, the major field, residence) are compared against other groupings of students. For example, responses to an attitude survey by students at one college are compared to responses from students at another college. On occasion, systematic differences between groups are assumed to reflect differences in the environments of these groups. This is particularly true when the conceptual orientation of the study is person-environment interaction.

Thus the focus of inquiry has been on characteristics of the environment or on characteristics of large numbers of students grouped by environment. Little attention had been paid to the experience of the individual as he or she interacts within these environments.

Studying the dynamics of self-selection into environments forces us to look at person-environment interaction from the perspective of the person. In doing so, a number of limitations with the studies reviewed come into focus.

A major limitation is that in these studies the significant environments for study have been defined, a priori, by the researchers. This has limited the bulk of research to four or five environments; particularly students' major fields. Yet it is patently obvious that a student's world consists of multiple environments including peer groups, student associations and extra-college activities. As will be shown in the research reported here, the quantity of learning environments students experience and their relative levels of significance among students is far more complex than previous studies have allowed for.

A second limitation of an environmental perspective is that it assumes a constant level of "press" of environments across students. So for instance, the learning press of an environment is assumed to exist independently of the students in that environment (Fry, 1978). Naturally, such an environmental perspective neglects the effects of individual motivation on person-environment interaction. But as this research shows, motivation, in the form of short term goals, is a critical variable in accounting for why an individual views a learning environment as "most significant." A question this raises but unfortunately remains unanswered, is how much of a press does an environment have if it is not viewed as very significant?

The last set of findings reported here concerns the effects of learning style on the process of self-selection. In the case of those environments considered significant by the individual and which are necessary for his or her goal attainment we find no significant relation between the learning press of the environment and the individual's learning style. But in those significant environments unnecessary for goal attainment, the learning press is almost always matched with the person's learning style. This finding suggests that there is something inherently attractive about learning environments that are "syntonic" with learning style and further data are provided that support this. However, a person's goals may require him or her to choose environments that are not syntonic.

These findings support Kolb's thesis that students are attracted to learning environments commensurate with learning styles. But they also suggest that there are other factors at work in the selection of learning environments and that the process of accentuation is more complex than has heretofore been proposed.

Accentuation of Learning Style Through P-E Interactions. A series of studies conducted over the past ten years by David Kolb and his associates have examined the "learning styles" of students in various major fields. The notion of learning style comes from Kolb's Experiential Learning Theory. As we will be using this theory in the study to be reported, some time will be spent here examining the theory and related studies.

Learning is conceived as a four stage cycle by which experience is transformed into concepts which, in turn, are used as guides in the choice of new experiences (Kolb, 1976) The cycle as depicted in Figure 5-3 posits that concrete experience (CE) is the basis for observation and reflection (RO). Through abstract conceptualization (AC) these observations are generalized for further action and tested out through active experimentation (AE) leading to new experiences. Each stage of the cycle or "learning mode" refers to four different kinds of abilities.

The skills which make one good at CE are in some sense contradictory to AC skills. For instance, concrete experience requires an openness to the world, a suspension of cognition and an opening to sensory stimuli; whereas abstract conceptualization requires a bounding off of the world and recess into cognition. The same is true for AE and RO. Reflective observation is an internal mulling around--a contemplation or meditation--comparing mental images. Active experimentation on the other hand is an acting out on the world comparing events against expectations.

Kolb posits that these contradictions reflect two dimensions to learning and cause individuals to prefer and more often use one mode over the other on each dimension. Matching all possible combinations of preferences on the two dimensions, he arrives at four learning styles depicted in Figure 5-4.

Kolb (1976) has developed a short self-report form that intends to measure an individual's preferred learning style, the "Learning Styles Inventory" (LSI). The latest reliability and validity measures for the LSI are reported by Kolb in a forthcoming issue of the Academy of Management Review, 1981.

In an early study using the LSI, the learning styles of 800 practicing managers and graduate management students were examined by plotting the mean scores of individuals with similar undergraduate majors (Kolb and Goldman, 1973). The scores fell into learning style quadrants which, intuitively, make sense. For example, those with undergraduate English majors fell into the Diverger quadrant. Those who had been in engineering fell in the Converger quadrant.

In a recent article (Kolb and Plovnick, 1976) much of the research on match or interaction between learning style (P) and major field (E) is recounted. In one study, physics majors with convergent learning styles were more likely to be

FIGURE 5-3 : THE EXPERIENTIAL LEARNING MODEL

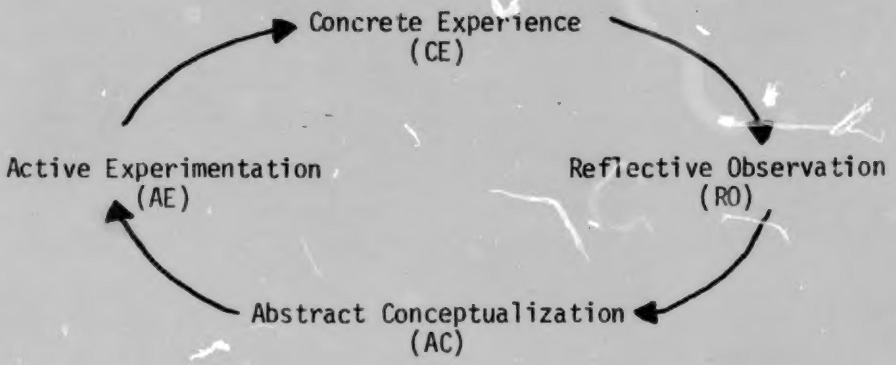
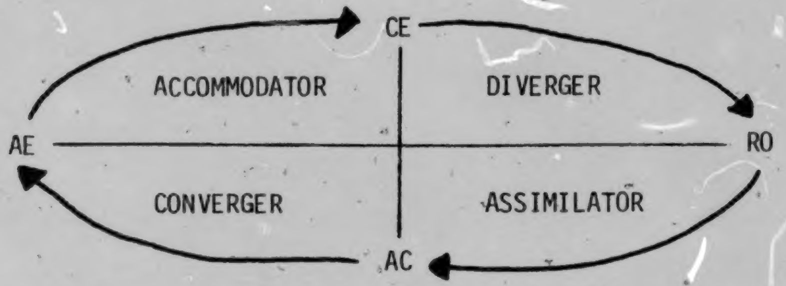

Concrete Experience
(CE)
Reflective Observation
(RO)
Abstract Conceptualization
(AC)
Active Experimentation
(AE)

FIGURE 5-4 : THE FOUR LEARNING STYLES


CE
ACCOMMODATOR
DIVERGER
AE
RO
CONVERGER
ASSIMILATOR
AC

content with their major than other physics students. In another study, math majors with assimilator learning styles reported intending to pursue graduate study in math much more often than math majors with other learning styles. In a study of four different majors, each hypothesized to be characteristic of a different learning style, students were asked to rate how important it was for them to pursue their major field. In each major the mean importance rating was higher for students with matching learning styles. The difference was significant in two of the four majors.

Kolb (Kolb and Fry, 1975) argues that this data indicates the process of accentuation at work in college and in the general career development of individuals. He argues that students are attracted to a discipline because of a match between their learning style and the learning demands of the field of study. These learning styles are further accentuated through the socializing influence of education.

Unfortunately, Kolb reports no data on the learning style of incoming undergraduate freshmen in various major fields. This is a major gap in the data surrounding his theory of accentuation and though probably due to Kolb's focus on career development, still needs rectification.

Another problem with these results is that some major fields fall into different quadrants depending on the group measured. Kolb, at times, explains these differences by saying that academic departments, while having similar names, are very different. At other times he explains it as a phenomenon of the total college (e.g., MIT tends to have an abstract bias versus Harvard).

Research of the differential effects of total college environments versus the impact of curricular environments have, in general, produced contradictory results. In the Pace (1964) study reviewed in Section V-B, he found that across a number of colleges, total environment was more important than major in terms of students' self-reported progress toward educational goals. Nichols, however, found that change in intellectual aptitudes was more related to major field than total college environment (Feldman and Newcomb, 1973a).

This confusion results, to some extent, from not having commensurate measures of both the person and the environment. In the learning style studies, the "press" of major fields have been inferred from the LSI scores of students in those fields. A person-environment match is assumed. For some disciplines, such as engineering or theoretical physics, the matches seem clear. But for others, such as economics, the relationship is more dependent on the nature of the specific department.

To redress this, Fry (1978) attempted to develop an observation tool that would measure the "learning press" of college courses. He conceptualized four different "environmental domains" each matched with or "syntonic" with a particular learning mode. Fry defined these environments in the following way (1978, pp. 50, 52):

A. The Affective Domain (corresponds to concrete experience)

This aspect or type of environment typifies situations where what is being learned is non-paradigmatic and humanities-based. The emphasis is on the individual learner's understanding his feelings, values, reactions, etc. to subject matter or problem situations. It is highly personalized in giving feedback to the learner vis a vis his actions and in changing activities or events based on what the learner wants to do or desires to change. It tolerates ambiguity more than the other types and tends to be very interdependent.

B. The Symbolic Domain (corresponds to abstract conceptualization)

This aspect of environments is most easily contrasted with the Affective domain. What is being learned tends to be science based and paradigmatic. Thus there is emphasis on getting solutions and deriving theories using strict rules of logic, symbols, analytical methods, etc. Information is abstract and events control learners (unilateral) in contrast with Affective situations.

C. The Perceptual Domain (corresponds to reflective observation)

This aspect of environments emphasizes the exploration and understanding of basic relationships between causes of events and phenomena. Learners are encouraged to watch, listen, think, and reflect on things from different points of view before determining their own.

D. The Behavioral Domain (corresponds to active experimentation)

Here the emphasis is on use or application rather than understanding or theory. It is autotelic in nature. Learners are more responsible for their actions and what they do influences what they can or will do next. Learners tend to work alone and on practical or real problems as if they were professionals.

The observation tool had five scales of four items each (see Section V-B). Data collected with the tool was compared against student rankings of four paragraphs designed to reflect these domains. In seven out of ten courses, the student rankings agreed with the observational data on predominant environmental domain.

The data on the match between these environmental domains and learning mode is more fuzzy. Fry hypothesized that students would prefer environments matched with preferred learning modes and used this as the criteria for assessing the validity of his constructs.

While the relationship between person-environment match and preferences is an area of much theoretical contention in the literature,[1] these contentions rest on differentiating degrees of match in both positive and negative directions. Fry was merely attempting to ascertain the relative degree of one environmental orientation over another in any given course; not, say, the relative complexity of that press matched with a learner's skills. At such a gross level of measurement, the use of preference as a criteria for congruence or "syntonicity" is acceptable within any theory of person-environment interaction we have seen.

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[1] For example, Lawton (1975) uses Helson's homeostatic conception of "adaptation level" to argue that a perfect match between the person and environment will lead to a neutral response. He suggests rather, that mild deviations from perfect match will be experienced as affectively pleasant. He uses data from Wohlwill's study of stimulation response as support for this view. On the other hand, Kahana (1975) presents data to suggest that "satisfaction" is highest the closer the match between needs and environmental press. Though her study is on homes for the aged, she uses a modified form of the CCI and Activities Index. Her findings are in line with Sterns (1962) assumption that students will find colleges whose press corresponds to their needs "especially congenial."

Preferences did not come out in exactly the way hypothesized. Rather than matches with modes, preference matches were obtained for learning style. Specifically, Accommodators tended to prefer Behavioral environments, while Assimilators tended to prefer Perceptual and Symbolic environments. No data were available for other environments.

To summarize, a number of studies have suggested an accentuation of learning styles takes place during college. The key environment that has been studied is the major field. However, few studies have explicitly measured that environment. Fry's recent work offers a conceptual model and the beginnings of a methodology for just such an environmental measure as shown in the previous Section (V-B) of this report. Application of this measure will concern us in the study to be reported.

Working Assumptions for this Study. Based on the previous discussion of accentuation through P-E interaction in college and our discussions of research on college press (Section V-B) the following assumptions and conclusions guide the present inquiry.

1. All studies reviewed have explored P-E interaction during college life from an environmental perspective.

Studies of the effects of college life are overwhelmingly environmental in perspective. Even those which measure individual characteristics only (such as studies on values) grouped respondents according to categories of environmental (e.g., type of college, major field). In this, the experience of the person as she or he goes through college has been neglected.

Such an omission is undoubtedly due to a number of factors. One has probably been the popularity of the widely used College Climate Index (CCI) and its derivatives. Another has to do with the fact that funding sources for these kinds of studies are usually more interested in policy related data. This kind of data usually requires comparative studies across a number of environments (e.g., schools). A third reason is that many studies are attempts to find variables which can be manipulated by administrators or faculty to enhance or change the effects of college. This requires focusing on the environmental context, not the individual person.

2. All studies have attempted to bound the characteristics of the person and the characteristics of the environment into predefined categories.

Virtually all these studies use survey methods requiring tightly constructed questionnaires that probe only at those variables under study. The aspects of the environment under study tend to be segregated. Some studies look only at residence, others only at major fields and so on. With the exception of a few CCI studies, there has been little comparative analysis of the differential impacts of various environments.

Characteristics of the person have also been tightly bound and typically assessed with a psychological test that purports to measure "values," "needs," or "personality" characteristics.

3. This has resulted in a neglect of the person's subjective experience of college environments.

The question comes down to how much can we know about the impact of a college on a given student from reports of mean responses to a given item from a thousand students. Many theorists and researchers in the social sciences have discovered time and again that people create images of their environment and then act based on those images. Among the researchers in social psychology, perhaps Jerome Bruner's (e.g., 1973) experiments have been most widely read. In them he demonstrates how selective people are in their attention, how what they see is based on what they already know to be there.

Surveys of large populations are useful for uncovering social facts and necessary for depicting the constellation of possible environmental impacts. But the study of person-environment interaction also requires investigation of the phenomenal, "subjective" world in addition to the social, "objective" one.

4. Colleges are made up of multiple environments and the impacts of those environments will be different on different students.

Many studies have been able to demonstrate characteristic differences on various measures between the mean scores of students in different colleges, different academic departments, and different residence groupings. But examination of the range of response on virtually any of these scales makes it quite clear that individuals can deviate enormously from these profiles and still live in these milieux.

Further we find the college environment, at various levels of analysis, having impacts on similar dependent variables. For example, seeking advanced schooling has been related to needs-environment press, values-major field, needs-major field, learning style-major field, faculty-student interactions, faculty-student major, among others. Which is doing what to whom, when?

When we look at studies of what students report as their "most modifying experience" or "had the biggest impact on me" we find a wide divergence. Typically, these studies find characteristic differences between, for example, sexes or schools. This is probably why they got published. But they alert us to the variety of environments that can and do have impacts on individuals in their college years.

5. We need to understand individual maps of the environment before we can predict the impact of environmental press.

Actually, most studies implicitly recognize the need to study what is salient to the individual. They try to guess what will be most important and then measure that. This may be easier to do in studies of person-environment interaction around the physical environment, such as in human factors engineering. But when we talk of something as abstract as a "learning environment," it behooves us to get a little clearer about what that means to the individuals under study. Particularly when the outcome we are looking at is learning. A hunch is that the paucity of positive results coming out of Aptitude-Treatment Interaction studies results directly from the (often) meaninglessness of the treatment to the individual: that is, the lack of any accounting for the motivation of that individual to be subjected to the treatment.

For example, Cronbach and Snow (1977, pp. 35-351) summarize a number of studies which attempt to discover how best to "organize" material in a text to increase student retention. As they admit, the results are "confusing" if not contradictory. In one study, different groups of undergraduate students were asked to read similar texts on Buddhism with different "organizers" as the treatment. On a delayed post-test, certain organizers appeared to increase retention by students with low verbal ability. In a different study using text on an imaginary science called "Xenograde Systems" the organizer seemed more harmful than helpful for retention and the aptitude-treatment interaction was the reverse of the first study.

What is unclear in these studies is where these students came from (psychology undergraduates?) and whether they were at all interested in Buddhism or "Xenograde Systems." Were they volunteers in a psychological experiment? What did these students anticipate as the consequences of their performance on these post-tests?

The main premise here is that college is made up of multiple environments and that people have different mental images of these environments. Further, the press of an environment will only exist to the extent that a person is motivated to interact "successfully" in that environment. At its crudest level, college only has an impact on those who want to be there and interact within it.

Motivation in person-environment interaction studies has only been looked at with reference to "needs." This has allowed researchers to neatly categorize motivation within whatever need taxonomy they choose. But the major source of human motivation, recognized over and over again, are individuals' anticipations of future events (Cofer and Appley, 1964), one type of which we refer to as people's goals.

Goals are often implicitly used to explain results of person-environment interaction studies. For example, Manring (1980) makes the same implicit assumption: "When we look at the effects of symbolic press . . . it does not significantly mediate experienced tension from being blocked or alienation. We infer that the symbolic press of one's job is not perceived as connected to the mainstream of the organization or reward structure " (p. 102)(see also Section V-F of this report). The inference here is that people are concerned with the reward structure and that without this motivation, the press has no effect. The reference to the "mainstream of the organization" suggests that people have goals to be in the "mainstream," probably to "move up," and as the press is not connected to these goals, it has no effect.

When Herbert Simon (1969) argues that "A man, viewed as a behaving system, is quite simple. The apparent complexity of his behavior over time is largely a reflection of the complexity of the environment in which he finds himself" (p. 52), his argument is based on the thesis that behavior is adapted to goals. He concludes that behavior only reveals those characteristics that limit adaptation. In other words, the press of the environment is only felt, and acted on, in response to goals. If one has no desire to learn high school French, no amount of progressive teaching or experimental "treatments" are going to help. If the goal is to "pass the course," then one will be more likely to learn how to pass and this may not be synonomous with learning French. Only that press associated with goals will have an impact on the individual.

In the following, we look at results from a study of students' images of their environments during college. First we will examine the range of learning environments students select themselves into. Then we will look at those environments students report as most significant and examine the relationships goals and learning styles have to these significant environments.

1. Background to the Research. As part of a larger study on the professional education and career development of engineers and social workers, a study of the environmental press in these two schools at Case Western Reserve University commenced in the Fall of 1978 (see Section III-B).

Volunteers were sought from the junior and senior years in the engineering school and the first year in a Master's program in the School of Applied Social Science (social work). Essentially, professors teaching required courses in these fields were approached to volunteer for the study. Upon securing agreement, their classes were canvassed for volunteers. A target of ten students from each school was set to develop a "panel" which would undergo a series of intensive interviews. After the first interview, a couple of students dropped out of the study leaving us with nine from each school.

2. Definition of Key Terms. Six key concepts are operationalized in this study. These are learning style, goals, learning environments, most significant environments, environmental press, and syntonicity between environment and learning style.

The conceptual foundation of Kolb's theory of learning styles has been reviewed in this paper, as well as in Section IV of this report. For our purposes here, we will simply say that an individual's learning style is that which is measured by the Learning Styles Inventory (LSI).

An individual's goals are future states or events the person wishes to make happen and is working toward. Goals may also include objects the person wants to acquire in the future. Two important qualities of goals are that they are conscious and that the individual perceives their attainment as tied to his or her volition. Goals are not unconscious motivators, nor are they things people may desire but perceive as outside their control to attain. In this study, goals refer to short term (i.e., six month) objectives or aspirations verbalized by respondents during the first and second interviews. For purposes of analysis, only the list of goals which remained after the second interview are used.

Learning environments are defined broadly to account for the fact that virtually any experience can be learningful. The notion of environment though requires a kind of permanence or the probability that more than one incidental experience will occur within its boundaries. For example, a happenstance interaction with another person may be a learning event but does not have the quality of "environment" that interactions with a significant other in a relationship has.

For our purposes, learning environment refers to courses, contexts, physical spaces, events, and interacts described by students in response to the question, "What do you think will be significant learning environments for you next semester?" These are here defined as the learning environments students "self-select" themselves into. Hereafter we will use the terms learning environment and environment interchangeably.

Most significant environments are those environments listed by the student which he or she ranked as the top four or five most important.

The "press" of an environment are those characteristics which require the individual to possess or develop certain skills or attitudes, perform certain behaviors, or which respond to or reinforce certain needs. Here we are concerned with those characteristics of an environment that are commensurate with learning styles. The environmental press of different environments was assessed through respondents' answers on the "APSB Paragraph Ranking Questionnaire" (PRQ--Appendix I.) The PRQ asks respondents to rank order four paragraphs each describing a different environmental orientation considered syntonic with two of the four learning styles (after Fry, 1978).

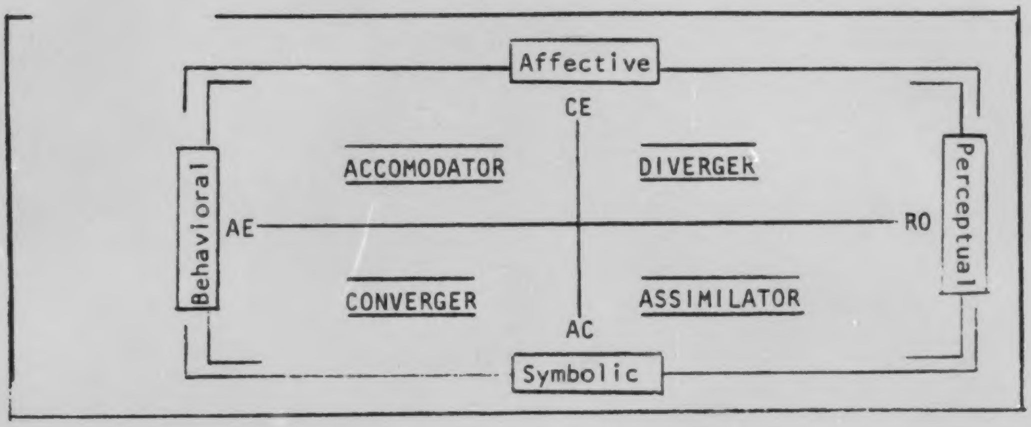
Syntonicity between environment and learning style is the relationship assumed to exist between four different environmental orientations (Affective, Perceptual, Symbolic, Behavioral) and learning styles. Syntonicity means that the information in the environment, the media via which it is transmitted and the learning tasks are such that a particular learning style is best suited to learn from/in it. This constitutes a modification of Fry's earlier (1978) hypothesis that environmental press was related to the four learning modes and is consistent with the results of his study. The relationships assumed to exist are shown in Figure 5-5.

As the figure shows, an Affective environmental press is assumed to be syntonic with both the Accommodator and Diverger learning styles. From a different perspective, an Assimilator learning style is syntonic with both Perceptual and Symbolic presses.

3. Methodology (also see Section III-B). A series of three interviews were held with panel members over the course of the Spring Semester in 1980. Of the engineers, three were seniors and six were juniors. The social work students were all in their first year of the Master's program. Each respondent was interviewed separately.

The first interview occurred sometime in December or early January. At this time the LSI was administered. In the course of the interview, students were

FIGURE 5-5 : LEARNING STYLE AND SYNTONIC ENVIRONMENTAL PRESS


Affective
CE
ACCOMODATOR
DIVERGER
Behavioral
AE
RO
Perceptual
CONVERGER
ASSIMILATOR
AC
Symbolic

asked to list all the learning environments they thought would be significant to them over the semester. Respondents were encouraged to consider other possible environments in addition to those typically associated with learning (i.e., classes). Individuals seemed to have little difficulty with this, some listing as many as ten significant environments on top of their course load.

Respondents were then asked what goals, objectives, hopes, or desires they had for their lives over the next six months. These were recorded by the interviewer. The respondent was then asked if he or she could prioritize these goals. Only a couple of students had difficulty with this. Next, the student was shown the list of environments he or she had just generated and asked to rank order them in terms of their "importance." All respondents were able to do this easily.

During the second interview in March, respondents were reminded of the goals, environments, and rankings they had provided in the first interview. They were asked if there were any changes they would like to make. In a few instances goals were changed; usually because they had already been achieved. Interestingly, in all but two cases changes were made in the rankings of environments. Reasons for these changes varied. In one case an environment didn't exist anymore. In a few instances, rankings of courses were changed as they had turned out differently than expected. In one instance the environment was perceived as having given all the satisfaction it would and so ranked lower. All in all, there appeared to be no pattern to these changes.

The goals, environments and rankings that remained after this interview are those used for the purpose of this analysis. The top four or five environments were considered "most significant" and respondents completed a battery of questionnaires dealing with them.[1] One such questionnaire administered at this time was a 12-item semantic differential (Appendix L). Respondents were asked to fill one out for each of their top environments.

Between the second and third interview "target courses," that is, courses which contained at least three panel members were observed a number of times.[2] As well, toward the end of the semester, students in these classes filled out many of the same instruments used with panel members.

During the third interview (mid-May to early June) respondents were asked to complete the APSB Paragraph Ranking Questionnaire (PRQ) for each of the most significant environments. As well, they completed a second LSI. One of the engineering panel members disappeared before he could be interviewed, reducing the sample to 17.

1. Maps of the Environment. The first question that concerns us is "What are the images college students have of their learning environment?" It was

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[1] In some instances a "target course" being studied in the research project was substituted for the fifth ranked environment.

[2] Results of these observations are discussed in Section V-B.

argued earlier that colleges are made up of multiple environments and that students will have different mental images or "maps" of their relevant environments. We expected there to be differences between the relative importance of one's major field, residence, and peer relations among students. However, we were not prepared for the overwhelming diversity of environments considered relevant by students.

A content analysis of all environments listed by students presented in Table 5-6 looked at only environments that were not specific courses or field placements. This was due to the fact that we had added these to students' lists as a matter of course during the interviews.

Our combined sample of 17 students listed 80 environments, of which 35 were totally different types! Of these 35, only five environments (14 per cent) were listed by four or more students!

However, inspection of those environments considered by students as the five most important provides a more sobering picture. In our undergraduate sample of engineers, 19 (48 per cent) of the 40 environments are courses. For the graduate social work students, the figure is 33 (73 per cent) of 45 environments.

It is not surprising that school work should be more on the minds of graduate than undergraduate students. Still, when you consider that more than half of the undergraduates "most important" environments were not courses, it raises serious questions about limiting the focus of inquiry to major field; or any one particular environment. The data strongly suggest that the environments of college students are much more complex than has been allowed in the research literature to date.

What are we to do then? Do we have to accept that college students' images of their environments represent a complex phenomenon peculiar to each case? Or can we find some underlying organizing principle? Our data suggest that two factors underlie which environments are most important to students: their goals and their learning style.

2. Learning Style, Goals and Significant Learning Environments. Two operations were performed on students' most significant environments to determine what relations could be found among the data. First, environments were analyzed for syntonicity with learning style. Data on each environment were obtained from the rankings students provided on the PRQ. Because the measure of press comes from perceptions of respondents, we tested to see if responses might be an artifact of learning style. McFee's study of the CCI (discussed in Section V-B) in which she found no relation between individual needs and their perceptions on that needs based environmental press measure, is relevant to us here. We obtained similar results, suggesting that respondents can rate environments independently of the individual characteristics these environmental measures attempt to match.

Specifically, data from all students in target courses (including non-panel students) were analyzed for the effect of respondent's learning style on the PRQ they filled out for that course. In each of the five courses, students were grouped by their learning style and by their PRQ rankings. These were then cross-tabulated for each course resulting in four 4 by 4 tables per course or twenty 4 by 4 tables in all.

TABLE 5-6 : LEARNING ENVIRONMENTS OF ENGINEERING AND SOCIAL WORK STUDENTS (not including courses)

Environments	Students listing this one	N
1. friends	d,e,g,i,l,m,o,q	8
2. talk with others in my field	d,f,g,j,l,n	6
3. work/job	d,f,h,j,k,q	6
4. home (parents)	g,i,m,n,q	5
5. reading	d,l,m,n	4
6. student activities/clubs	b,i,n	3
7. TV/papers	d,e,p	3
8. a student lounge	i,l,p	3
9. opposite sex	b,c,q	3
10. student residence	b,c,f	3
11. political action groups	n,o	2
12. job interviews	c,e	2
13. spouse	d,e	2
14. studying at home	d,e	2
15. interaction with people	d,n	2
16. relations with instructor	i,l	2
all other environments expressed by only 1 person		19

A. Number of environments per subject:*

a=1 d=9 g=5 j=3 m=3 p=2
b=6 e=6 h=3 k=1 n=10 q=4
c=3 f=6 i=8 l=7 o=3

B. Total number of environments listed by 17 students = 80
$\bar{x} = 4.7$
range = 1 - 10

C. Total number of different types of environments = 35

*nb. students b and i listed the same type of environment twice and student n did this for two different environments

If the learning styles of individuals alters their perception of the environment, then we would expect there to be consistent similarities in the ways students with similar learning styles rank the PRQ. We would then expect to find significant relationships in at least some of the aforementioned 4 by 4 tables. In 19 of the tables we did not get a relationship (correlation) even approaching .1 and none of the relations were significant. So it seems clear that our environmental press measure is not effected in any consistent way by learning style.

Using the data provided by panel members' PRQ and their LSI scores, we considered an environment as syntonic when the paragraph ranked the highest coresponded to the individual's learning style as depicted in Figure 5-4 . All other environments were considered non-syntonic.

Through this operation we discovered that 47 (55 per cent) of the 85 environments were syntonic. This, of course, is not above the level of chance.

Next we assessed each environment for its relation to the person's goals. If the environment appeared as one that was necessary for the student to engage with in order to accomplish his or her goals, this was noted. Here we discovered that 65 (76 per cent) of the environments ranked as most significant were necessary for goals.

When we look at the relationship between these two variables, syntonicity and goals, the picture gets interesting. Table 5-7 shows the cross-tabulation of these two variables. Ultimately, 98 per cent of all most significant environments are accounted for; they are either syntonic with learning style or related to goals.

Of particular interest are the eighteen environments unrelated to goals but syntonic with learning style. Here we see that a match between learning style and environment account for 90 per cent of those non-goal related environments. Obviously there is something "important" about syntonic environments, particularly those unrelated to goals. This may be a function of "preference" as Fry has suggested. It may be that there is something inherent in the matching that is important. Kolb and Fry (1975) explain the underlying logic of self-selection into syntonic environments as the movement toward environments, where one has the skill to be successful and so feel competent and empowered and good about one's self.

To explore if there was something different about syntonic environments versus other environments, data were used from the semantic differential. Unfortunately, data from the social work sample are unavailable and so only the engineering sample could be studied.

Factor analysis of the data along the lines suggested by Osgood, et al. (1957) uncovered three factors underlying engineering students' descriptions of their learning environments. We have called them "challenging-dull," "good-bad" and "fun-work." Together they account for over 90 per cent of the variance. Assuming environments viewed as challenging, good and fun would be the most attractive

TABLE 5-7 : ENVIRONMENTS AS NECESSARY FOR GOAL ACCOMPLISHMENT BY SYNTONICITY WITH LEARNING STYLE

		necessary for goal accomplishment			
		NO	YES	N	%
syntonic with learning style	YES	18	29	47	55
	NO	2	36	38	45
	N	20	65	85	
	%	24	76		100

N=85
Q= -.84
p .001

ones, we grouped environments into those attractive and those not attractive. Cross-tabulating this "attractiveness" variable with syntonicity produced a moderate significant relationship shown in Table 5-8.

To further explore the interaction, we used the necessity of the environment for goal accomplishment to control for this relationship (see Table 5-9).

Initial observation of the resulting conditional tables suggested a type of relation referred to as a "specification" (Davis, 1971). Rather than partial out the controlling variable, we examine the relationships within each conditional table and find a "perfect" relationship (Q = +1.0) between attractiveness and syntonicity in those environments unnecessary for goal accomplishment. For those environments necessary for goal attainment, the relationship is negligible (Q = +.08). Whether or not an environment is necessary for goals specifies the relationship between attractiveness and syntonicity such that when an environment is not related to goals, it tends to be both syntonic and attractive.

While the n is low and the margins too skewed to place a great deal of confidence in these findings, they are suggestive: Students select themselves into environments that tend to be syntonic with their learning style if they are unnecessary for goal accomplishment (Table 5-7). These syntonic environments tend to be attractive (Tables 5-8 and 5-9). It is as though environments necessary for goal attainment have a "have to" quality to them; while those significant environments chosen by students that have no, or less, relation to their goals have a "want to" quality. Here we have one thread of evidence to substantiate the notion of "preference" in the match of learning style and environmental press.

Conclusion. The evidence indicates that learning style plays a role in the self selection of significant environments in college. Consistent with Kolb's hypothesis, the underlying factor in this self-selection appears to be that syntonic environments are generally more attractive to the person.

But the desire to attain goals can and does lead the individual to choose environments that are non-syntonic. This is, perhaps, not very surprising. Lewin recognized and demonstrated the importance of goals of "quasi-needs" in the development of images of the environment in his early experiments with children (e.g., 1935).

This begs the question of where goals come from. While we cannot answer that here, the evidence does seem to indicate that goals are not wholly tied to attractiveness or syntonicity. That is, people do not necessarily choose goals because they allow them to interact in syntonic or attractive environments. People can and do choose to interact in environments where the learning press is different from their preferred learning style. While choosing environments where one's individual characteristics match the "press" probably allows for a sense of competence and stability, interaction in unmatched environments most likely provide the catalyst for growth and development of other sides of the person. While this can be painful and the environment can be seen as "dull, bad and/or work," it is the vision of some desired future that propels the individual through those times.

TABLE 5-8 : ENVIRONMENTS AS ATTRACTIVE BY SYNTONICITY

		attractive			
		NO	YES	N	%
syntonic with learning style	YES	10	13	23	58
	NO	11	6	17	42
	N	21	19	40	
	%	52	48		100

N=40
Q= +.41
p .01

TABLE 5-9 : ENVIRONMENTS AS ATTRACTIVE BY SYNTONICITY, CONTROLLING FOR NECESSITY FOR GOAL ACCOMPLISHMENT

necessary for goal accomplishment	syntonic with learning style		attractive NO	attractive YES	N	%
YES		YES	10	7	17	52
		NO	10	6	16	48
		N	20	13	33	
		%	61	39		100
	Q* = +.08					
NO		YES	0	6	6	86
		NO	1	0	1	14
		N	1	6	7	
		%	14	86		100
	Q* = +1.0					

* nb. these are conditional Q's

Clearly, the "goal" is a critical variable in understanding why people choose some environments over others. It may well be that the human capacity to "rise above one's self" and pursue ends through environments ill-matched to one's abilities is what distinguishes "development" from "adaptation."

One could easily imagine such a "developmental" scenario occurring through required courses in professional education. If the goal is to matriculate in the given professional curriculum, then required courses are taken, regardless of match with learner style. Once in the course, the press or demands for certain learning competencies forces the student to develop those particular competencies she or he may not be particularly oriented toward. Hence with an example from the previous study (Section V-B) a social work student who wishes to attain his or her degree in the administrative track "has to" select a particular methods course. Suppose the student's learning skills lie in the divergent area (concrete-reflective), as did a good number of our student sample, and the press of the course, as shown in our previous study, has a high Behavioral orientation. This is a non-syntonic situation with the individual's goals accounting for the selection of the environment as "significant." Development of behaviorally-oriented learning competencies is likely to occur from this situation.* Thus, the environments of required courses in professional education can have a major impact on the type and direction of development one experiences, if those courses are felt to be significant to the student's short-term goals. Otherwise, mere adaptation can be expected.

The above reasoning leads to new and interesting issues concerning the design of required courses in professional education. If they are to have a developmental impact, do the instructors have any idea of the press that is operating? Is that social work faculty member teaching the required methods course cognizant of a behavioral orientation that is potentially mis-matched with the majority of learner style in his classroom? The findings here suggest that Fry's (1978) environmental press model (APSB constructs) is useful for understanding learning environments in ways that relate meaningfully to individual goals and learning styles.

That something like a "learning style" accounts for people's choice of some environment is perhaps more surprising than the impact of goals. But then, learning style is an attractive concept. A number of theorists studying person-environment interaction have recognized the utility something like "personality style" would have in accounting for their data. By personality style they do not mean personality characteristics or fixed traits, but some sort of patterned tendency to act in certain ways or prefer some things over others. For example, in studying the aged and adaptation, Lawton (1975) explicitly recognizes what such a concept might do for his data but has no adequate construct. In the field of vocational behavior, Osipow (1968) echoes the same concern.

A good argument can be made that technically, "personality" and "learning" are very different and so would be their "styles." But there is no question that Kolb's learning styles construct is well within the vague parameters Lawton and

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*It is also possible, of course, that if the environment is not felt to be significant, but the course is nonetheless required, then the student works (uses skills she or he already has) to make it through with minimal response to the developmental press.

Osipow set. Besides, there is a common sense reality to the notion that some people learn better some ways than others; that this might influence environmental choice, vocational behavior and adaptation at any age.

Implications for Future Research. While this research only looks at one aspect of accentuation (self-selection) it raises questions about the other aspect --socialization. Are there different socializing impacts of learning environments that are syntonic versus those that are not? Would we expect a shift in the learning style of someone whose most significant environments all had a non-syntonic press? We probably would. What though of someone who has a balance of syntonic and non-syntonic environments? Would they cancel each other out or would those non-syntonic ones, because they are unmatched, have a greater press? Less press?

What of the effect of goals? Do only those environments that are "have to's" have a socializing press? Can an environment not be seen as necessary for goal accomplishment and have the same strength as one that is?

This research also indicates that any one environmental domain is inadequate, in and of itself, in studying accentuation of learning style. We cannot focus only on the major field if we want to understand the whole story. It is quite possible that a student's most significant environments not be his or her studies. For instance, in our panel, one engineering student's first four most important environments are heavily Affective in orientation. This matches his Divergent learning style. On the other hand, engineering courses are predominately Symbolic in orientation (see Section V-B). If we were only to look at this student vis-a-vis his major, as has been the tendency in P-E research in professional education, we would conclude that accentuation had not taken place. This highlights the need to expand the measurement of environmental domains to encompass those the student experiences as most significant.

An important next step in the study of accentuation of learning styles in college would require monitoring a sample of students from the time they enter to the time they graduate. Changes in LSI scores would be monitored over that period of time as would goals. Data on the learning press, as well as the semantic differential, would be collected for all environments, not just the most significant. If done properly, this would allow us to see what effects environmental press have on changes in learning style and the effects of goals on this process.

D. Assessing the Learning Press of Technical Work Environments

Walter H. Griggs

Introduction. Organizational task environments have been studied from a number of perspectives. Industrial engineers attempt to discover the components of efficiency; sociologists are concerned with such things as: worker membership in their task groups, membership in particular occupations or professions, and managers and their role in society. Organizational psychologists, on the other hand, have focused on such issues as socialization and training, supervisor-subordinate relationships, performance measurement, communication and decision-making. Other psychological orientations seek to discover the relationship of an individual's abilities and aptitudes and their relationship to occupational choice (Van Maanen and Schine, 1977).

More recently, educational, cognitive, and child psychologists have focused on the attempt to identify the personality correlates which bias a person toward particular occupations (Van Maanen and Schein, 1977). This later perspective sees individuals from a developmental perspective which has important implications. The developmentalist perspective recognizes that persons develop and change over time. If development or learning is a function of a person's interaction with the world around him and continues throughout the person's lifetime, then the organizational settings in which persons spend their lives are by definition "learning environments" and need to be studied and understood as such.

Recent progress in educational research in developing a concept of "learning environment" has led to new designs in educational programs tailored for particular kinds of learning. While, as yet, no singular concept of learning environment exists, focus on the issue represents a promising conceptual shift. The shift is away from the assumption that differences in what individuals can and will learn is primarily a function of the individual's traits and abilities toward the idea that differences in learning may be as well a function of differences in the environment.

This conceptual shift further recognizes Lewin's classic postulate that behavior, in this case learning, is a function of both personal and environmental variables. This line of reasoning also implies that optimal learning occurs when there is an effective match between individual learning styles and compatible environmental characteristics (see Sections V-E, F and G).

When we begin to go beyond the idea of learning as limited to the years of formal education and recognize that learning is a life-long process, new questions emerge. Or perhaps the questions remain the same, but the context changes, i.e., "Under what conditions do people learn most effectively?" becomes "How can we measure stimulus for learning in the context of work organizations?" What are the design concepts for creating task environments in which a better match between individual adult learning styles and environmental characteristics are made possible? Since our central concern is with adult learning, the critical need is to develop ways of measuring learning press in the context of work environments. Equally important is the need to be able to describe those environmental characteristics in terms commensurate with descriptions of individual learning styles as will be discussed in Section V-E. "Commensurate terms" in the context of this study means being able to talk about people and task environments in approximately the same language or at least within the same classification scheme. Some recent research (Fry, 1978) on educational environments provides a useful starting point for examining the process of adult learning as it occurs in the pursuit of professional careers. Using experiential learning theory as a starting point, Kolb and Fry (1975) developed a tentative typology of learning environments. This typology was an important first step in developing a methodology for measuring personal and environmental variables in commensurate terms. Fry (1978) extended this work by developing a model of graduate level learning environments from which differences in learning situations can be identified in a form commensurate with individual differences. The observational tool developed by Fry provides a useful model from which an instrument for measuring the learning press of professional work environments may be developed.

Cronbach (1975) argues effectively for "interpretation in context versus generalization across contexts," suggesting that it is more productive to deal in depth with the complexity of a particular work environment before attempting to generalize to larger categories of work environments. Consistent with this argument we have chosen the task and organizational setting of professionally trained engineers and engineer-managers as the unit of analysis. While our ultimate research aim is toward a general method for measuring learning environments, we believe an in-depth study of this particular professional setting serves the ultimate purpose for at least two reasons. First, engineering is the second largest profession in the United States. As such, the various phenomena associated with the education, socialization and career dynamics of engineers have been studied and documented extensively. These are important data on which to build an understanding of the learning experience of individuals in a particular field. Second, sometime during their careers, most engineers face the dilemma of a major shift from the technical work they were professionally trained to perform to managerial work which they must learn to do in the context of large organizations. Hence there is a consistent challenge for most engineers to learn on the job. By implication then, the organization becomes the educational medium for professionally trained engineers as they prepare for a transition to the new career as a manager.

In the context of the above issues the primary emphasis of this study is on the development and validation of an instrument which measures the demand characteristics in engineering organization work settings commensurate with a model of adult learning. The theoretical foundation of this study is grounded in experiential learning theory (Kolb, 1971) and role theory (Kahn, Wolfe, et al., 1964).

Defining the Engineer's Learning Environment. This study of person-environment interaction focuses on the subjective frame of reference; i.e., we are interested in individual's perceptions of certain structural and processual characteristics of their work environment. Koffka (1935), one of the earliest proponents of this phenomenological orientation, defined the behavioral environment, not as it is, but as it is perceived and experienced. Lewin (1936) further expanded the phenomenological approach with his field theory conception of life space. To Lewin, "behavior is a function, not of the objective physical properties of the stimulus world, but of a world transformed into an 'inner world' (psychological environment) by a cognizing organism" (Walsh, 1973).

Pervin (1968) and Stern (1970), for instance, have defined the behavioral environment according to the individual's perceptions of it and reactions to these perceptions. In order to compensate for not dealing with how the physical nature of the environment influenced behavior, Stern aggregated individual perceptions of the environment in order to attain the "best estimate" possible of the behavioral environment.

Holland (1966) suggested that the dominant features of an environment are dependent upon the typical characteristics of its members. An opposing view is presented by Barker (1968) whose behavior setting theory posits that envionments select and shape the behavior of people who inhabit them.

The focus on both the psychological and physical environment vary across the theories mentioned above. Similarly, the concepts and measures which are used to operationally define the individual and the environment vary from theory to theory.

To suggest that both the psychological and physical environment are part of the reality of individuals remains a conceptual bypass unless both can be operationally defined in commensurate terms. Previously cited research (Fry, 1978) in educational settings using cognitive style as a starting point suggests that this is not only important but also possible.

Prior to Fry's work, Altemeyer (1966) examined the relationship between the development of individual learning style and differences in learning environments. In a study of two undergraduate programs at Carnegie--engineer/science and fine arts--he found that learning styles of engineer/science majors, as one would expect, increased in rational logical reasoning skills over the four year program. Fine Arts majors increased in creative problem-solving skills in the same four year program. The surprising finding was that each group lost skills during the same period. Engineer/

science major lost creative problem-solving capability, while fine arts majors lost rational-logical thinking skills. Since education has previously been considered only an additive process this was indeed a startling discovery. The French expression "La Deformation Professionel" is an appropriately descriptive term when applied to the phenomenon of perceptual bias derived from a specialized education. This expression, often used among European engineers, describes their tendency to see all situations in terms of "problems to be solve"--usually through a rather mechanistic approach.

While specialized education does prepare an individual to respond to certain demands of the work environment, it does not prepare him/her for other demands. Individuals do, as suggested by the previously cited research, develop specific learning styles which favor one learning mode over another. They acquire, as it were, a professional deformation. They tend to approach most problem situations in much the same way and view data in the environment consistently from one frame of reference. These particularized ways of responding reflect the geotypic character of education. In addition, professional education also provides phenotypic level skills to be applied in way consistent with the genotypic-adaptive competencies. The difference between genotypic and phenotypic, as we are using it in this context, is in the distinction between how one learns (cognitive style) and what one learns (mathematics). Professional education for engineers is designed to teach the application of theoretically based principles of the natural sciences to real problems. Previous research (Kolb, 1975; Altemeyer, 1966; Fry, 1978) suggests that the student learns not only the course content (mathematics, physics, etc.), but also learns to favor abstract conceptualization and active experimentation as preferred cognitive orientations. In the process he/she learns social behavior appropriate to the "role" of student. The result is a "professional deformation" (Sims, 1981) which includes a preferred cognitive style, a way of "being" in the world as well as a set of phenotypic level skills. What is neglected in professional education is preparation of the individual in terms of the social behavior appropriate to a particular role in the organization, as evidenced in the Professional Schools Study (Section V-B).

We see a need to understand the implications of both the nature of a particular occupational role as well as the nature of the task performed. Previous research suggests, for example, that social behavior, if not determined, is certainly limited by an individual's perception of the behavior appropriate to particular occupational roles (Kahn, Wolfe, et al., 1964). Other research has shown that most jobs contain a "task traction" which is inherent in a set of tasks and lies outside of the sphere of socially influenced bheavior (Davis, 1972). The most obvious example of task traction is assembly line work where almost all of the worker's behavioral repertoire is determined by the number of operations assigned to him/her and the speed of the line. This design principle has been used by job designers for decades and its application extends to areas beyond the assembly line even though its presence is more subtle and often merges or becomes inextricably linked to role demands. For example, the way an engineer is assigned a particular section of a design problem usually means operating within the constraints which guide his/her choices in the use of the prevailing conventions of applied technology. Inherently, then, problems are approached in generally standardized ways (task traction), while particular choices are often a function of interaction among peers and supervisors (social traction).

Role theory as developed by Wolfe (Kahn, Wolfe, et al., 1964) provides a useful conceptual framework for looking at the social psychological processes existent in organizations. Wolfe describes the theory as follows:

> In role theory the social system (e.g., the organization in which one works) consists of a lattice or network of interdependent positions or roles. In analyzing the role pressures on a given individual, how position is termed the focal role which is connected directly to a unique set of significant others, called role senders, with whom he is directly interdependent within the system (indirectly he relates to a great many others within the network, but their effects are mediated, largely through interaction with his role senders). . .
>
> Each of the members of one's role set have a direct stake in how he performs his role. They each hold expectations about what he should and should not do, how he should handle problems or maintain relationships. Some of these are matters of personal preference but many have to do with managing things around which they are interdependent. In some fields the issues are restricted to task behaviors, but in many the expectations go beyond this to what he should believe and how he should think and feel.
>
> When these role expectations are communicated through work or action, they become role pressures, and, of course, they are most apt to be expressed when the focal person's behavior violates expectations or when other conditions call for a change in behavior. Members of one's role set are called role senders because of the pressures they exert to influence what he does in role. It is through these (sometimes direct but often subtle and indirect) pressures that the focal person learns, day by day, how to be in his career.
>
> Some role pressures are prescriptive, some proscriptive, and many are merely informative. Over time the members of any group tend to develop a shared sense of reality and a con-

sensus around at least the most important and relevant behaviors, goals and values. The transmission of these expectations vis-a-vis behaviors, goals, and values become a part of what we have previously defined as environmental press (Wolfe and Kolb, 1978).

Inherent in these role pressures is a press for differential kinds of learning. Some pressures may be compatible with the person's dominant cognitive style; others may press for development of a quite different orientation. For example, an engineer may have a well developed rational-logical-deductive capacity as a result of his professional training. On the other hand, he may be relatively undeveloped in his capacity to relate effectively to others in his organization. He may be ill-equipped to understand the nuances of human behavior because his dominant cognitive orientation may be incompatible with the mode in which stimulus for the new learning occurs.

If we are to design work environments in which people can continue to learn and develop, we need to understand both the source of an individual's particularized cognitive style as well as the nature of the learning press inherent in a particular environment. The further need is to be able to define and measure both sets of variables in commensurate terms.

This perspective of task settings in organizations as "learning environments" has led to the selection of experiential learning theory (Kolb, 1971) as the most appropriate conceptual framework on which to build a model of person/environment interaction. The application of Kolb's theory and Learning Style Inventory to assess learner styles and related generic competencies has been described elsewhere (Sections IV-C and V-C). We turn now to a discussion of its applicability to understand the environment.

Learning Press in Organizational Task Environments. An important implication of experiential learning theory research is the recognition that environmental forces tend to reinforce or accentuate an individual's preferred learning style. Hence, students trained in engineering sciences often become what Kolb calls convergers with a preference for practical application of ideas. Other kinds of educational programs tend to develop different styles. Fine arts education, for example, tend to press for development of the opposite "diverger" learning style which emphasizes strength in creative imagination. Earlier we termed this result of this accentuation of learning style "professional deformation." Often when asked how he thinks an engineer will respond to "I think like an engineer;" when pressed for more specifics he will answer "I think rationally, logically, and keep my emotions out of it." The organizational task environments of professionals contain forces like task demands and role pressures which also reinforce or accentuate particular learning styles. This aspect of organization life may become a source of difficulty for those who consider changing careers. A change in career often requires different competencies or preferred learning style. A common dilemma for professionally trained engineers results from a decision to move out of the technical career track into the management track. Managers are often "Accommodators" with strengths somewhat different from the "Converger" orientation of the engineer. Where the engineer (Converger) prefers working with structural problems, the manager's job presses for involvement with and a facility for dealing with unstructured situations. Engineers take pride in being fact-based and methodical. Managers, on the other hand, are seen as pragmatic, experimental, and in cases where the facts of a situation conflict with the plan or theory, would be likely to disregard the theory.

In addition to task demands, there are the more subtle demands and pressures associated with particular roles in organizations. A starting assumption is that some environments are differentially loaded with manifestations of four types of complexity: Affective, Perceptual, Symbolic, and Behavioral (after Kolb and Fry, 1975). For example, self-initiated action under optimal conditions of freedom and reward often lead to increased behavioral complexity. If, on the other hand, the same self-initiated action resulted in punishment, then the effect would more likely be regressive.

Schoder, Driver and Streufert (1967) hypothesize a curvilinear relationship between one's behavior and the complexity of environmental characteristics. This work suggests that for each individual there is some optimal level of stress from the environment (complexity of information, cost-reward) corresponding to optimal conceptual and behavioral performance by the person. In a research engineering environment the optimal relationship might be described as one where the incumbent has opportunities to view projects or problems from different perspectives. He/she might participate in structured synectics exercises where novelty of problem solving solutions is high valued--thus increasing his/her *perceptual complexity*. The existence of a mentor who demonstrates knowledge and competence--as well as style--may provide an important role model which is instrumental in the development of *affective complexity*. Exposure to increasingly complex projects requiring exposure to new technologies might lead to increases in *symbolic complexity*, while increasing responsibility may lead to increases in *behavioral complexity*.

Measures of Learning Press in Task Environments. The previously discussed lines of research on learning styles and learning environments provide a most promising framework for determining the nature of differences in organizational task environments that facilitate or inhibit the development of professional adults. Fry's success in measuring learning press differences in graduate school courses provided important impetus to develop an instrument capable of measuring differential learning press in professional task environments. Our decision was to develop a self-administered instrument consisting of items designed to elicit responses reflecting differential press vis-a-vis affective, symbolic, perceptual and behavioral complexity existent in the nature of the person's task and in his/her immediate organizational setting.

On the basis of earlier work in educational research (Joyce and Weil, 1972) Fry hypothesized five categories of indicators of the four kinds of complexity existing in course content and methods of structuring the learning environment. These categories of indicators and how they are manifested in each of the four types of environments are presented in Table 5-10.

In order to extend Fry's work to work organizations we hypothesized a need to tap two sources of learning press; one, the content of the specific task itself and two, the nature of role pressure experienced in the organizational setting.

Task Variables. In order to tap into learning press inherent in the task content we developed six categories of indicators which would permit us to differentiate among the four complexities. These indicators for task were:

1. Variety--the primary focus and range of activities required of the incumbent
2. Challenge--the nature and extent to which task requirements challenge the skill and capability of the incumbent
3. Orientation toward time--the degree to which task and role requirements press for a consciousness of differences in the nature of experienced time
4. Information--the kind of information in which an incumbent's tasks involved him/her
5. Job scope--the relative scope of task demands in terms of depth or breadth and the degree to which they are integrated
6. Application of knowledge--the degree to which task demands press for application of technical knowledge, relating to people or creative thinking.

Our assumptions about how these indicators are manifested differently within each of the four complexities are as follows.

Variety. Affectively complex environments are those which involve the job holder in a wide range of contacts with people. Task accomplishment requires working with and through others in ways that deal effectively with the feelings and values of others. Variety may be a function of the number

TABLE 5-10 Descriptive Indicators of Learning Environments

CATEGORY OF INDICATOR	TYPE OF ENVIRONMENT Affective	Perceptual	Symbolic	Behavioral
1. Objectives:	Basic purpose is to experience an event or activity, to be aware of one's feelings while going through it.	Basic purpose is to understand something, to know how and why things relate to each other.	Basic purpose is to solve a problem, to obtain a solution through use of theory and analytical skills.	Basic purpose is to apply skills and knowledge to practical problems such as one would experience as a professional.
Principal focus or source of information being dealt with:	Information is here and now, in the form of personal feelings, values, opinions, ideas, etc.	Information is derived from examining how something occurs, focusing on the process, reviewing past events, etc.	The source of information is abstract or there and then, derived from readings, lecture inputs, compiled data, etc.	Focus of information flow is on getting some task done, derived from previous work; plan critiques, evaluations of progress, preparing for a presentation, etc.
3. Nature of feedback and rewards:	Feedback is personalized, based on each individual's own needs and learning goals.	Learner determines criteria for evaluation and is left to determine own criteria for performance	Performance is evaluated against right or best answer as judged by the body of knowledge or the teacher's expert opinion.	Output is evaluated against criteria of practicality, feasibility, sellability, etc.
4. Nature of learner's role:	Learners freely express personal feelings, opinions and values concerning topic or activity they are engaged in.	Learners are encouraged to observe, listen, write, think, discuss, etc. in order to determine meaning and relevance of subject matter for themselves.	Activities and communications are governed by rules of inference, methods, terms, etc. often subject to learners' memory recall.	Learners make own decisions about use of their time. Choice and actions at one point in time influence what occurs next.
5. Teacher role:	Teacher portrays a model of the profession and colleague such that learners learn by his example and through relating (identifying) with him.	Teacher is nondirective, reflective, and nonevaluative. He teaches by helping the learner to discover his own perspectives, insights, etc.	Teacher is the expert authority, interpreting the field of knowledge or judging what is correct, competent, acceptable performance. He may also be an enforcer of rigor, methods, or rules stipulated by the body of knowledge he represents.	Teacher is a consultant or coach available at the learner's request to advise or impart his knowledge of the field he represents.

Source: Fry, 1978

of people dealt with or the level of interpersonal interaction or both. Mangers, salespeople, counselors, personnel officers, are examples of jobs with a high affective component.

Symbolically complex environments are those which require the job holder to use abstract tools such as formalized rules of inference, mathematical formulae, computer simulation, theories and principles. Variety is a function of being called on to use a number of different abstract tools in daily problem solving. Typical examples of jobs with a high symbolic component are engineer, physician, economist and computer systems designer.

Perceptually complex environments are those which require the job holder to observe and reflect on phenomena in order to understand cause and effect relationships, creative possibilities or potential consequences from possible courses of action. Variety is a function of exposure to new situations, phenomena or data which require new theories or understanding. Typical examples would include research scientist, psychoanalyst, strategic planner and mathematician.

Behaviorally complex environments are those which require the job holder to perform a wide range of activities. Variety results from the range and/or the number and kind of activities engaged in, all requiring different kinds of skills. Typical examples are managers of small businesses, foremen, general repairmen and nurses.

Challenge. Affectively complex environments challenge the job holder to develop increased competence in interpersonal relations. Meeting personal and organizational objectives is due to increased understanding of the sources of the behavior of self and others which permits a higher degree of interpersonal influence.

Symbolically complex environments challenge the job holder to maintain or increase mastery over a range of theoretical or technical skills. The challenge is to remain technically current in one's professional field or to master new technologies.

Perceptually complex environments challenge job holders to increase the number of theoretical frameworks available for viewing new phenomena or situations.

Behaviorally complex environments challenge the job holder to increase his/her skills and techniques needed to carry out a larger number of organizational activities.

Orientation Toward Time. Affectively complex environments require the person to be immediately present in the current situation and generally this means staying focused on the emotions and behavior of self and others as group activities are carried out.

Symbolically complex environments require a consciousness of well defined time increments related to the interdependence of activities. Order and regularity are valued as a means of controlling key elements in the task environment.

Perceptually complex environments generally press for a future orientation with larger and less well-defined sense of time increments. Closure on projects or problems tend to determine time rather than time determing closure.

Behaviorally complex environments are characterized by a strong sense of time as the critical resource or element to be dealt with. Often there is a sense of too many activities for the amount of time available.

Information. Affectively complex environments tend to require responses to data emerging in the situation and often are about the feelings, values, or concerns of others. The dominant form of information is in verbal is verbal communications.

Symbolically complex environments require dealing with abstract forms of information like charts, tables, computer printouts and formulae. The data may be either historical or current as in the form of process monitoring devices such as gauges, computer simulation, etc.

Perceptually complex environments require the use of multiple forms of data representing elements in a causal chain. The data may be verbal (oral or written) and relate to human or mechanical systems.

Behaviorally complex environments emphasize the value of information representing the state or progress of goal directed activities. The form may vary from concrete to abstract and from oral to written reports.

Job Scope. Affectively complex environments involve the person in a wide range of interpersonal situations. Often there are a number of other persons or groups which must be responded to. Sensitivity to the nuances of communication and behavior is a prerequisite for task achievement.

Symbolically complex environments involve the person in a wide range of technologically based activities. The use and application of the "tools of the trade" in solving increasingly complex and varied problems is common.

Perceptually complex environments press for increasing understanding of the consequences of alternative approaches in terms of "system level" effects. The future impact of decisions are conceived and tested theoretically or through simulation techniques.

Behaviorally complex environments press for involvement in and control over a wide range of interdependent activities. The scope of discrete tasks may be small or large; however, at some level, they are interdependent with the systems goals.

Application of Knowledge. Affectively complex environments press for the application of interpersonal skills in carrying out organizational objectives. Understanding and responding effectively to the nuances of feelings and values expressed in behavior is requisite to influence and mastery in these settings.

Symbolically complex environments press for use of abstract theoretical principles usually gained as a result of formal training in a particular technology.

Perceptually complex environments tend to press for application of more generalized forms of system level problem solving. Often the situation calls for the use of multiple as opposed to singular frames of reference to comprehend the relationships among phenomena in the field.

Behaviorally complex environments encourage the application of technical knowledge and experience to problems in the immediate field. The emphasis tends to be on practical and pragmatic as opposed to the elegant and theoretical solutions.

Organizational Variables. In order to tap into learning press inherent in the more subtle, but nonetheless real, influence from role pressures, we created seven categories of indicators related to organizational processes. These were:

Feedback on performance: The nature of the methods and procedures for an individual receiving feedback on how well he/she performs individual tasks or organizational functions.

Behavioral norms: "A set of assumptions or expectations held by members of a group concerning what kind of behavior is right or wrong, good or bad, appropriate or inappropriate, allowed or not allowed" (Schein, 1963).

Superior/subordinate interaction: The nature of the dominant style of superior/subordinate interaction with particular emphasis on the nature of that relationship in the context of professionals in a hierarchically ordered organization.

Selection and promotion procedures: The nature of the methods and procedures through which individuals are selected for particular assignments and promotions.

Criteria of organizational effectiveness: The nature of the implicit or explicit definition of the purpose and function of the organizational unit and the nature of what constitutes organizational effectiveness as perceived by job incumbents.

Educational experiences: The nature and kind of experiences in the context of the organization which constitute education or lead to increases in personal competence.

Character or personality of the organizational unit: The individual's perception of the organizational unit's primary orientation or focus, vis-a-vis, client systems in the organization's field.

The underlying assumptions of how each of these categories of role press are manifested relative to the four complexities are as follows.

Nature of Feedback. Affectively complex environment: feedback is personalized and based on each individual's own needs and personal career goals.

Symbolically complex environments: feedback is evaluated against explicit standards of performance and/or the superior's expert knowledge.

Perceptually complex environments: feedback is based on mutually developed and agreed on performance standards and assessment criteria.

Behaviorally complex environments: feedback is based on practical results of individual effort or feasibility and "sellability" of ideas or suggestions.

Behavioral Norms. Affectively complex environments: encourage the expression of feelings, opinions, and values as they are affected by task requirements and organizational processes.

Symbolically complex environments: the press is for rationality and procedure and avoidance of emotional expression.

Perceptually complex environments: encourage individuals to spend time reflecting, thinking and discussing situations with colleagues in order to arrive at new understandings.

Behaviorally complex environments: press role incumbents to make decisions and take action according to their own sense of task priorities.

Superior/Subordinate Interaction. Affectively complex environments encourage a shared sense of collegial relationship among peers and superiors. Superiors are often perceived as role models.

Symbolically complex environments press for impersonality in superior/subordinate interaction and place emphasis on the superior's role as expert and technical leader.

Perceptually complex environments press for mutual exploration of ideas and perceptions in order to increase understanding.

Behaviorally complex environments press for superior/subordinate relations based on an implicit "advice as needed" contract. Superiors are usually viewed as "consultant" or "coach."

Selection/Promotion Procedures. Affectively complex environments support open discussion and participation in selection and promotion decisions. Interpersonal issues are seen as a legitimate part of decision criteria.

Symbolically complex environments emphasize procedures, rules, and objectivity in selection and promotion decisions.

Perceptually complex environments press for selection and promotion decisions within the context of the larger and more long range career planning process.

Behaviorally complex environments press for results oriented criteria as the basis for selection and promotion decisions. Past performance weights more heavily than future potentialities.

Criteria for Organizational Effectiveness. Affectively complex environments are oriented to client system satisfaction as the primary criteria for performance. Subjectivity in customer or client feedback is accepted as legitimate.

Symbolically complex environments regard technical competence of organizational members as the critical criterion for success and effectiveness.

Perceptually complex environments regard creativity and elegant solutions as key indicators of organizational success.

Behaviorally complex environments encourage "results oriented" and/or competitive superiority as the most critical measure of organizational effectiveness.

Educational Experience. Affectively complex environments: education and development is perceived as a product of involvement in real life experiences over time.

Symbolically complex environments: education and development is perceived to be primarily a function of acquiring new or updated technological skills as a result of learning new formulae, theories or technical procedures.

Perceptually complex environments: education and development are seen as a result of self-directed experimentation, observation and reflection.

Behaviorally complex environments: education and development are seen as a function of having to assume new levels of organizational responsibility. Learning by doing is valued over formalized training procedures.

Character or Personality of Organizational Unit. Affectively complex environments: role incumbents see the organizational unit as basically service or people oriented. Personal response and enjoyment with customer or client systems is seen as central to the mission of the organization.

Symbolically complex environments: press for an image of task oriented, technically competent problem solving effectiveness. Applied technological competence is seen as the hallmark characteristic of the organizational unit.

Perceptually complex environments: technical elegance and sophistication is the preferred image. Frontier or leading edge development is valued over more routine technical application.

Behaviorally complex enviornments: are characterized by a commitment to practical results. The preferred image is of a "real world" and action oriented organization.

Instrument Development. Based on the theoretical constructs covered above, a 52-item questionniare was developed. The questions in the Environmental Press Instrument (EPI) were reviewed by a committee of behavioral scientists in two sessions. The purpose of these reviews was to test the logic, sentence structure and semantics of each question. The committee members were asked to sort the 52 items of the questionnaire into five groups. Four of the groups represented the four modes--i.e., affective, symbolic, perceptual, behavioral--the fifth group were those about which the members were unsure. The results of this process resulted in considerable rewriting and refinement of the items.

Following the second session the instrument was administered to two engineers who were unconnected with the eventual subject group. The engineers were subsequently interviewed and suggestioned other instruments. The instruments which are relevant for our study are described briefly as follows:

Environmental Press Instrument (EPI). This instrument is comprised of 52 items with a 7-point scale arranged in two parts. Part I focuses on task variables and Part II focuses on organizational variables. Part I consists of six topic areas relating to task variables. Each topic contains four statements each of which corresponds to one of the four complexities which are associated with the learning style mode. Affective complexity relates to concrete mode, symbolic complexity relates to the abstract mode, behavioral complexity relates to the active mode, and perceptual complexity is related to the reflective mode. Respondents are asked to indicate the degree of "best fit" of each item to their current job (see Figure 5-6 for example).

Part II consists of seven topic areas relating to organizational variables and is similar in format to Part I (see Appendix K for the complete instrument).

Work Abilities and Job Characteristics Instrument. These two instruments use the same 24 items with Likert-type scales to measure the degree of diverger, assimilator, converger, and accommodator qualities a person possesses in his work ability and perceives in his current job. To measure work abilities, respondents are asked how they would rate their level of ability in 24 areas, whether or not they use them in their present work. Job characteristics (identical in structure to the work abilities instrument) are measured by respondents indicating how much each item is descriptive of their current work situation. Section IV-C has illustrated how items in the Work Abilities Instrument correspond to the four modes as measured by the Learning Style Inventory.

Methodology. The instruments described above were administered to 91 individuals (30 managers, 61 engineers) in two different, technically-oriented companies. Twenty-nine managers and 58 engineers completed the questionnaire. Further descriptions of the two sites and samples are provided in Section III-D.

Although in the context of the larger research project, several other instruments, including a one-hour long open-ended interview were used, the discussion here is focused on an analysis of the environmental press instrument results.

To facilitate concentration on each of the four kinds of press, we have organized the discussion of results in four sections covering one complexity at a time.

The organization of all four sections follow much the same format. The section begins with a brief review of the concept and assumptions about the particular complexity followed by a detailed discussion of how each questionnaire item fared as a result of the statistical and qualitative analyses to which it was subjected.

These statistical analyses included the following:

1) Item/whole correlation, i.e., the Pearson Product-Moment correlation

FIGURE 5-6

Example of E.P.I. Questionnaire

ALL JOBS HAVE SOME DEGREE OF VARIETY WHICH VARIES BOTH IN INTENSITY AND KIND. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE PRESENT IN YOUR JOB:

1. My job requires almost continuous contact with a number of different people.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

2. My job requires the use of a wide range of symbolic tools, i.e., mathematics, theories, principles, computer simulation, etc.

1 2 3 4 5 6 7

3. My job requires that I analyze and view problems from a number of different viewpoints.

1 2 3 4 5 6 7

4. My job requires that I perform a wide range of activities, i.e., planning, scheduling, feeding data to computers, negotiating for resources, etc.

1 2 3 4 5 6 7

of the individual affective questionnaire item with the total of the affective questionnaire items.

2) A T-test of the hypothesized direction of mean scores for engineers and managers for affective, symbolic and behavioral items and the mean scores for senior managers, senior engineers versus team managers and engineers for perceptual items.

3) Correlation with Job Characteristics Index, i.e., the Pearson Product-Moment correlation, of the questionnaire items with the affective mode index of the Job Characteristics Instruments

4) Discriminant analysis, i.e., the F values, are reported representing the degree to which the item discriminates between a) engineers and managers, and b) between engineers and managers in four organizational settings (Company A is treated as one organizational setting, where Company B is divided into three organizational units) for the affective, symbolic and behavioral modes. For the perceptual mode the groups are senior managers and senior engineers versus team managers and engineers.

The following is a discussion of each of the questionniare items.

Affective Complexity. In this section we will discuss the questionnaire items in terms of how well they appear to measure affective complexity existent in the task environment.

We have established that affective complexity relates to the concrete experience mode in experiential learning theory as developed by Kolb. We further suggested that affective complexity in the context of work can best be understood in terms of the press toward involvement in, and response to, concrete experience, whether with people or things. For example, a task may be affectively complex when it involves high contact with people in situations where outcomes are contingent on the job holder's awareness of the emotional response of a client, customer, superior, or subordinate. There can also be an affective component in tasks involving things or processes. Artists often discuss the emotional aspects from "hands on" involvement with the art media such as clay, paint, and the like. They may talk about the emotional effect of touching, shaping, or otherwise creating a physical representation of a mental image. With respect to the work of engineers and managers, the level of affective complexity is expected to be markedly different. The manager's job is typically conceived of as getting things done through other people. Managers are expected to be heavily involved with other people in negotiating for resources, influencing decisions, motivating subordinates, and in the many other interpersonally oriented transactions necessary for meeting organizational objectives.

Engineers, on the other hand, tend to be more isolated from other people and involved with data and things. Most engineering work is divided into fairly small formated segments to facilitate the individual's concentration on a specialized component or part of a larger machine or process. Thus, the engineer's task is often low on affective complexity, both in terms of contact with people as well as with the "hands on" involvement with mechanical systems or processes. It is difficult, for example, for an engineer to feel really involved with an automobile as an exciting new machine if his or her contribution is limited to designing the power brake unit. How narrowly proscribed the limits or design parameters are for an engineering project to a considerable extent determines the level of affective complexity inherent in engineering work.

With respect to the dimensions of task, the theoretical assumption was that the differential press for learning could be assessed by ascertaining the relative strength of the four modes organized under six generic headings. These are: task variety, challenge, orientation toward time, information dealt with, job scope, and application of knowledge. To assess differential press originating in the organizational work environment in the four modes, individual questions were asked under the seven generic headings. These were: the method of feedback, behavioral norms, dominant style of superior/subordinate interaction, selection/promotion procedures, organizational unit competence assessment, educational experiences, and the general character, or personality, of the organizational unit.

Table 5-11 illustrates how each questionnaire item fared, vis-a-vis its relative strength as determiend by statistical treatments. (Refer to sample EPI in Appendix for content of each question.)

Symbolic Complexity. In this section we will discuss how well the questionnaire items appear to measure symbolic complexity. Previously we established that symbolic complexity in the context of work can best be understood in terms of the press toward mastery of increasingly complex symbol systems. For example, a task may be described as symbolically complex when it involves the use of higher forms of mathematics or computer logic, or say the specialized language of a scientific discipline such as chemistry or biology.

In engineering work, the press for learning and maintaining proficiency in symbolic techniques varies widely. Engineers involved with research and development often experience a continuing press to learn new technologies or methods of analysis. Others are involved in what are often referred to as maintenance or "Kelly Girl Engineering" tasks. The term "Kelly Girl Engineering" is used to describe engineering work of low complexity and that which is highly repetitive. Managers, particularly those who move from technical career tracks, tend to experience less demand for increasing their symbolic repertoire. While they do learn new symbolic language, for example the language of accounting, these new symbol systems tend to be less complex as well as less pressing than that experienced in more complex forms of technical work. In terms of the dimension of task, the differential press for learning can be assessed by ascertaining the relative strength of

TABLE 5-11

Summary: Affective Items

				Discriminant Analysis	
Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	(1) 2 Group F Value	(2) 8 Group F Value
1	.692 s = .001	Confirmed s = 000	.488 s = .001	15.59**	5.09**
5	.703 s = .001	Confirmed s = 000	.421 s = .001	21.18**	5.73**
9	.400 s = .001	Inconclusive s = .449	.084 s = 219	.57	.13
13	.453 s = .001	Confirmed s = .002	.252 s = .008	10.23**	2.69*
17	.757 s = .001	Confirmed s = .000	.445 s = .001	22.09**	5.18**
21	.717 s = .001	Confirmed s = 000	.643 s = .001	19.99**	6.08**

TABLE 5-11 (continued)

Question	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis	
				(1) 2 Group F Value	(2) 8 Group F Value
25	.614 s = .001	Inconclusive s = 822	.153 s = 076	.138	1.35
29	.634*** s = .001	Inconclusive s = .116	.205 s = .026	2.22	2.19*
33	.410 s = .001	Confirmed s = .035	.101 s = 171	4.58*	2.15*
37	.621 s = .001	Confirmed s = .000	.208 s = 025	22.39**	3.33**
41	.442 s = .001	Inconclusive s = 1.00	.027 s = .399	.017	1.92
45	.287 s = .01	Inconclusive s = .828	.033 s = 379	.067	1.05
49	.535 s = .001	Confirmed s = .016	.431 s = .001	5.38*	3.82**

(1) The two groups were (A) all managers (B) all engineers.
(2) The eight groups were managers versus engineers in four organizational settings.

*s = < .05 ** s = < .01

the four modes organized under six generic headings. These are: task variety, challenge, orientation toward time, information dealt with, job scope, and application of knowledge.

To assess differential press originating in the organizational work environment in the four modes, individual questions were asked under seven generic headings. These were: method of feedback, behavioral norms, dominant style of superior/subordinate interaction, selection/promotion procedures, organizational unit competence assessment, educational experiences, and the general character or personality of the organizational unit.

Table 5-12 illustrates how each questionnaire item fared, vis-a-vis its relative validity as determined by four statistical treatments.

Perceptual Complexity. In this section we will analyze the questionnaire items in terms of how well they appear to measure perceptual complexity in the task environment. Earlier we established that perceptual complexity relates to the reflective observation mode in experiential learning theory (Kolb, 1971). Further, we suggested that this component of environmental press can best be conceived of in terms of the pressures existent in tasks, or in the organizational settings, which encourage or demand a job incumbent to observe, reflect, analyze and otherwise appreciate elements in the task situation. The press is for seeing and using multiple ways to understand phenomena and their relationships. While a great deal of engineering work is heavily applied in its orientation, and is consequently repetitive and limited in scope, other engineering work can be oriented toward unique solutions to new problems. The latter tends to be more associated with high technology industries and is more often found in research and development departments. However, both kinds of engineering are often carried out in different parts of the same organization. This can also be viewed as differential press toward more or less perceptual complexity. Similarly, both kinds of task environment exists for managers. Some managerial settings demand quite repetitive work, which is controlled heavily by prescribed routines and procedures. Other managerial work involves considerable potential for observation, reflection, and analysis in order to understand emergent trends and their attendant possibilities.

We hypothesized that a major source of the differential in perceptual press occurs as a function of organizational level and seniority. Specifically, we contended that both senior managers and senior engineers will experience greater press for perceptual complexity in their jobs than will more junior engineers and managers.

To test this hypothesis t-tests and discriminant analysis tests were performed using the senior/junior group differentiation rather than the engineer/manager group differentiation used in the analysis of the other three complexities.

The measures of differential press for perceptual complexity became most problematic in this research. Partly the reasons for the difficulties

TABLE 5-12

Summary: Symbolic Items

Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis (1) 2 Group F Value	Discriminant Analysis (2) 8 Group F Value
2	.591 s = .001	Confirmed s = 007	.206 s = 025	6.42*	2.10
6	.602 s = .001	Inconclusive s = 802	.395 s = .001	1.00	1.47
10	.327 s = .001	Inconclusive s = .144	-232 s = 014	2.62	2.60*
14	.478 s = .001	Inconclusive s = .95	.152 s = 076	.01	1.09
18	.667 s = .001	Inconclusive s = .202	.244 s = 017	2.09	.86
22	.616 s = .001	Confirmed s = 000	.145 s = 086	19.11**	2.47*
26	.622 s = .001	Inconclusive s = .957	.190 s = 036	.01	1.09

TABLE 5-12 (continued)

Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis	
				(1) 2 group F Value	(2) 8 Group F Value
30	.572 s = .001	Inconclusive s = 348	-.01 s = 48	.78	3.68**
34	.542 s = .001	Inconclusive s = 085	-013 s = .45	3.56	1.89
38	.448 s = .001	Confirmed* s = 017	-.019 s = 431	6.12*	1.87
42	.423 s = .001	Inconclusive s = 549	.269 s = .005	.78	1.18
46	.565 s = .001	Inconclusive s = 038	.188 s = 038	1.55	2.25*
50	.421 s = .001	Inconclusive s = 1.00	.10 s = .17	.00	.69

(1) Two groups = managers/engineers.
(2) Eight groups = managers/engineers in four organizational settings.

*s = < .05 ** s = < .01

are due to semantic problems and other reasons may include the possibility that, particularly for the two organizations studied, highly reflective task environments are a rarity. According to our model, the differential press for learning, vis-a-vis, perceptual complexity can be assessed by response to questionnaire items organized under six generic headings for task elements and seven generic headings for organizational elements. As in the case with the two modes discussed previously (affective and symbolic complexity) these generic headings were, for task items: task variety, challenge, orientation toward time, information dealt with, job scope, and application of knowledge. For organizational items: the methods of feedback, behavioral norms, dominant style of superior/subordinate interaction, selection/promotion procedures, organizational unit competence assessment, educational experiences, and the general character of personality of the organizational unit.

Table 5-13 summarizes how each questionnaire item fared, vis-a-vis, its relative validity as determined by four statistical treatments.

Behavioral Complexity. In this section we will analyze how well the questionnaire items appear to measure behavioral complexity. Earlier discussion suggested that behavioral complexity in the context of work can best be understood in terms of the press on the individual to increase his/her behavioral repertoire. This is consistent with the experience of most engineers as they first begin to assume supervisory and then later managerial responsibility. The transition involves movement from a specialist to a generalist orientation.

In organizations employing large numbers of engineers, the movement from engineer to manager usually begins with the assumption of project responsibility The press for an increased behavioral repertoire derives from the need to carry out new activities involved in the planning, coordinating, scheduling and follow-up of the project status. These new demands are reflected in the kinds of information dealt with, the sense of time, differences in perspective on priorities and objectives, etc. Consequently, we hypothesized that managers would experience a stronger press to develop an increasingly larger behavioral repertoire than would engineers.

As for the preceding three models of affective, symbolic, and perceptual complexity, questionnaire items for behavioral complexity were organized within the two groups of task and organizational variables with six generic headings for task and seven for organizational. Table 5-14 summarizes how each item fared vis-a-vis statistical tests.

Analysis of Selected Environmental Press Instrument Items. From those items selected on the basis of evidence of greater statistical support, we created a composite index for each of the four modes of environmental complexity. These indexes were in turn tested statistically. The results of these statistical treatments are covered below.

TABLE 5-13

Summary: Perceptual Items

				Discriminant Analysis	
Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	(1) 2 Group F Value	(2) 8 Group F Value
3	.546 s = .001	Inconclusive s = .602	.110 s = .15	.270	2.62*
7	.679 s = .001	Inconclusive s = .312	.198 s = .031	1.05	5.16**
11	.493 s = .001	Inconclusive s = .329	.109 s = .152	.962	1.22
15	.651 s = .001	Inconclusive s = .300	.015 s = 444	1.08	3.38**
19	.536 s = .001	Inconclusive s = .502	.102 s = .170	.45	1.81
23	.581 s = .001	Inconclusive s = .079	.021 s = 424	3.12	1.95
27	.607 s = .001	Confirmed s = .001	-.058 s = .307	12.57**	2.27*

TABLE 5-13 (continued)

Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis (1) 2 Group F Value	Discriminant Analysis (2) 8 Group F Value
31	.642 s = .001	Inconclusive s = .171	.323 s = .001	1.88	1.13
35	.481 s = .001	Inconclusive s = 461	.211 s = .023	.57	.54
39	.664 s = .001	Inconclusive s = .508	.009 s = .467	.44	2.20*
43	.454 s = .001	Inconclusive s = .886	.222 s = .017	.02	.59
47	.492 s = .001	Confirmed s = .047	-.050 s = .319	4.03*	1.16
51	.668 s = .001	Inconclusive s = .517	.074 s = .244	.42	2.08

(1) Two groups = senior managers and senior engineers versus team managers and engineers

** = .01
* = .05

(2) Eight groups = managers/engineers in four organizational settings.

TABLE 5-14

Summary: Behavioral Items

Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis	
				(1) 2 Group F Value	(2) 8 Group F Value
4	.586 s = .001	Confirmed s = 000	.341 s = 001	13.01**	8.36**
8	.543 s = .001	Inconclusive s = .901	.188 s = .038	.00	1.87
12	.535 s = .001	Inconclusive s = 242	.104 s = 164	1.34	..86
16	.717 s = .001	Confirmed s = 000	.362 s = 001	17.59**	5.49
20	.582 s = .001	Inconclusive s = 062	.276 s = .004	5.21*	2.68*
24	.277 s = .01	Inconclusive s = 726	.034 s = 374	.11	.94
28	.652 s = .001	Inconclusive s = 909	.172 s = 053	.05	.79

TABLE 5-14 (continued)

Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis (1) 2 Group F Value	Discriminant Analysis (2) 8 Group F Value
32	.435 s = .001	Confirmed s = .006	.258 s = .007	7.17**	1.62
36	.484 s = .001	Inconclusive s = .648	.012 s = .456	.08	1.11
40	.621 s = .001	Confirmed s = .006	.218 s = .02	5.67*	2.28*
44	.505 s = .001	Inconclusive s = 368	-069 s = .259	.86	2.61*
48	.371 s = .001	Confirmed s = 016	.341 s = 001	5.78*	1.86
52	.431 s = .001	Inconclusive s = 202	.014 s = 446	1.45	.91

(1) Two groups = managers/engineers
(2) Eight groups = managers/engineers in four organizational settings

**s = 01
*s = 05

Selected Items--Affective Complexity. This mode showed the greatest number of items which were statistically significant in the analysis presented earlier. Seven items were chosen as the most promising for refinement and inclusion in a second generation instrument (see Table 5-15). These were:

Question #1. My job requires almost continuous contact with a number of different people.

Question #5. The demands of my job continuously challenge me to learn how to get along with people better.

Question #13. Most of the information I deal with is current, immediate, timely (e.g., ideas, feelings, values, committing to goals, etc.).

Question #17. The scope of my job requires frequent exposure to a variety of emotional and/or conflict issues among superiors, peers, and/or subordinates.

Question #21. My job requires that I become aware of the feelings, values, and ideas of others as I interact with them in organizational activities.

Question #37. In my organizational unit selection and promotion decisions are discussed openly and freely.

Question #49. My organizational unit is primarily oriented toward people and service.

Selected Items--Symbolic Complexity. On the basis of the statistical results five question items were chosen as the most promising for refinement and inclusion in a second generation questionnaire (see Table 5-16). These items and a summary of their statistical results are as follows:

Question #2. My job requires the use of a wide range of symbolic tools, i.e., mathematics, theories, principles, and computer simulations, etc.

Question #18. My job requires an understanding of an involvement with a wide scope of technical aspects of projects.

Question #22. My job requires a primary focus on studying problems through the use of my theoretical and analytical ability.

Question #42. The effectiveness of my organizational unit is a function of the technical competence of the professionals in my unit.

TABLE 5-15

Statistical Results Summary: Affective Items

Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis F Value	Item/Whole Correlation of Selected Items
1	.692 s = 001	Confirmed s = 000	.488 s = .001	15.59 s = .01	.681 s = .001
5	.703 s = .001	Confirmed s = .000	.421 s = .001	21.18 s = .01	.709 s = .001
13	.453 s = .001	Confirmed s = .002	.252 s = 008	10.23 s = .01	.605 [illegible] .001
17	.757 s = .001	Confirmed s = .000	.445 s = .001	22.09 s = .01	.730 s = .001
21	.727 s = .001	Confirmed s = .000	.643 s = .001	19.99 s = .01	.820 s = .001
37	.621 s = .001	Confirmed s = .000	.208 s = .025	22.39 s = .01	.534 s = .001
49	.535 s = .001	Confirmed s =s = .016	.431 s = .001	5.83 s = .05	.655 s = .001

TABLE 5-16

Statistical Results Summary: Symbolic Items

Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis F Value	Item/Whole Correlation of Selected Items
2	.591 s = .001	Confirmed s = .007	.206 s = .025	6.42 s = .-5	.681 s = .001
18	.667 s = .001	Inconclusive s = .202	.224 s = .017	2.09	.655 s = .001
22	.616 s = .001	Confirmed s = .000	.145 s = .086	19.11 s = .01	.772 s = .001
42	.423 s = .001	Inconclusive s = .549	.269 s = .005	.78	.627 s = .001
46	.565 s = .001	Inconclusive s = .189	.188 s = .038	1.55	.687 s = .001

Question #46. Educational experiences in my organizational unit result primarily from having to learn new formulae, theories, or procedures.

Selected Items--Perceptual Complexity. This mode showed the fewest items with enough statistical support to warrant inclusion in a second generation instrument. Four items were selected even though two of the four were statistically weak on at least two of the five treatments (see Table 5-17). The items selected were:

Question #7. I am continually challenged to learn new ways to understand how things relate to each other.

Question #27. I participate in establishing standards of performance and assessment criteria for my current level of performance.

Question #31. I am encouraged to spend time observing, thinking, discussing in order to explore the meaning and relevance of elements in the task environment.

Question #47. The effectiveness of my organizational unit results from the creativity and imagination of my professional colleagues and myself.

Selected Items--Behavioral Complexity. Six items in the behavioral mode showed enough statistical support to warrant inclusion in a second generation instrument (see Table 5-18). These were:

Question #16. Most of the information I deal with focuses on the progress of some task or activity (e.g., preparing progress reports, revising schedules, getting data to or from the computer).

Question #20. I am involved in so many activities, it is hard to keep track of the progress in some areas.

Question #32. I make most of the decisions about how I schedule the use of my time on the basis of what needs to be done.

Question #40. In my organizational unit, selection and promotion decisions are based on results oriented critiera.

Question #48. Educational experiences in my organizational unit result from having to assume new responsibilities.

TABLE 5-17

Statistical Results Summary: Perceptual Items

Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis F Value	Item/Whole Correlation of Selected Items
7	.679 s = .001	Inconclusive s = .000	.198 s = .031	1.05 s = .001	.78 s = .001
27	.607 s = .001	Confirmed s = .328	.015 s = .444	12.57 s = .01	.638 s = .001
31	.642 s = .001	Inconclusive s = .389	.323 s = .001	.654	.720 s = .001
47	.454 s = .001	Confirmed s = .047	-.050 s = .319	4.03 s = 05	.658 s = .001

TABLE 5-18

Statistical Results Summary: Behavioral Items

Question #	Item/Whole Correlation	T-Test of Hypothesized Direction of Means	Correlation with Job Characteristics	Discriminant Analysis F Value	Item/Whole Correlation of Selected Items
4	.586 s = .001	Confirmed s = .000	.341 s = .001	13.01 s = .01	.667 s = .001
16	.717 s = .001	Confirmed s = .000	.362 s = .01	17.59 s = .01	.755 s = .001
20	.582 s = .001	Inconclusive s = .062	.276 s = .004	5.21 s = .05	.451 s = .001
32	.435 s = .001	Confirmed s = .006	.258 s = .007	7.17 s = .01	.565 s = .001
40	.621 s = .001	Confirmed s = .006	.218 s = .02	5.67 s = .05	.445 s = .001
48	.371 s = .001	Confirmed s = 016	.341 s = .001	5.78 s = .05	.565 s = .001

The items shown on the previous pages were used to create a composite index for each of the four modes. Three statistical treatments were applied to assess the validity of these indices. These were:

1. Correlation analysis--the mean scores for the items in each complexity were correlated with the corresponding job characteristic mode index.

2. A t-test was applied to each index to establish whether the differences in mean scores for the two groups were statistically significant.

3. A discriminant analysis--used to determine if the composite index discriminated between groups of managers and engineers, or as in the case with Perceptual Complexity, between (1) senior engineers and managers, and (2) junior engineers and team managers.

The results of these treatments are summarized in Table 5-19.

While the relative strength of this composite index varies among the four modes, it offers considerable encouragement to pursue further instrument development. In the process of analyzing each item, we gained important insights into the sources of difficulty and how these difficulties might be overcome.

Summary and Conclusions. The central task of this research was to develop a methodology for the measurement of learning press in technical work environments. We approached the task on the basis of a few basic assumptions which are worth reexamining. The basic assumptions which guided this research were:

1. Experiential Learning Theory as developed by Kolb and Role Theory as developed by Wolfe were the most promising as conceptual frameworks from which to approach the problem of commensurability, i.e., measuring personal and environmental characteristics within a common classification scheme.

2. The conception of work environments as learning systems facilitates a better understanding of the relationship between an individual's experience due to professional education and his lifelong experiences at work.

3. The task of understanding work is enhanced by a conceptual framework which comprehends both the genotypic as well as the phenotypic components in a task environment.

4. The learning "press" of task environments, like those in formal professional education, can usefully be viewed as having four

TABLE 5-19

Composite Index

	Pearson Correlation New Index Job Characteristics Index	Hypothesized Direction of Means Managers/Engineers T-Test	Discriminant Analysis F Value
Composite Affective Mode Index	.653 s = .001	Confirmed s = .000	45.128 (1) s = .01
Composite Symbolic Mode Index	.393 s = 001	Confirmed s = 004	9.223 (1) s = 01
Composite Perceptual Mode Index	.275 s = 006	Confirmed s = 044	3.90 (2) s = .05
Composite Behavioral Mode Index	.488 s = 001	Confirmed s = 000	34.002 (1) s = .01

(1) Group = managers versus engineers

(2) Group = senior managers and senior engineers versus managers and engineers

components, as in a space with four constellations: affective, symbolic, perceptual, and behavioral complexity.

Two questions arise when we review the above assumptions and consider possibilities for future research. The first concerns the basic model of Experiential Learning Theory and Role Theory as useful frameworks for dealing with the problem of commensurability in the measurement of person and environmental factors. The second question has to do with the particular methodology used to generate an instrument to measure environmental press. This latter question has two parts: One, what changes in methodology new seem appropriate on the basis of a post-hoc examination? And two, could this methodology be used to construct measures of environmental press in work settings other than engineering; i.e., is the methodology generalizable to other occupations?

With respect to the first question regarding our conceptual frameworks, we think the results reinforce our choice of Experiential Learning Theory and Role Theory. The data suggest that the problem of commensurability can be addressed effectively from these frameworks and that environments can be measured in terms of a four space model.

The second question asks whether we went about developing our instrument in the most effective way--or if not--what would we do next time? The advantages of hindsight press us to suggest changes in approach which can be articulated as follows. The first instrument items were developed in three steps, e.g., (a) by extending a framework developed by Fry which was designed to measure differential learning press in classrooms in a professional school. This extention involved generating categories of press perceived as existent in the task environment of engineers and (b) creating a series of questions appropriate to each of the categories (organized according to the four space mode, e.g., affective, symbolic, perceptual and behavioral complexity); (c) testing the question items through the use of a panel of behavioral scientists.

The major change we would suggest relates to both the process through which questions are developed and the choice of participants. Essentially we suggest accepting the same conceptual framework but rely on members of a professional group to be studied to help provide the particular questions. The process might follow the following steps:

1. Select a panel of participants composed of members of a particular profession to be studied and including behavioral scientists familiar with the basic frameworks.

2. Following a presentation of the conceptual framework and a list of suggested categories, request members of behavioral scientists and members of the professional group to organize in two person teams, one behavioral scientist and one professional, and to write down questions which best reflect each of the areas of the four space model.

3. Review the list of questions generated by the participants and select the eight or ten questions in each of the four areas based on group consensus.

4. Test the preliminary list by administering it to a larger sample and applying the appropriate statistical treatments.

5. Revise the instrument based on a joint review with the starting panel and the sample group.

This revised approach would appear to have the distinct advantage often associated with an iterative method which permits distillation and sharpening of question items. Further, it permits more effective conversion of conceptual statements into the specialized language of a particular profession.

A further refinement which may further support the objective of extending the generalizability of the instrument might be to apply the method described above using a panel of three or four disparate professional groups. The task would be to create an instrument generic enough to permit "across group" comparisons of different professional task environments. However, this suggestion moves us beyond our original acceptance of Cronbach's (1975) argument for "interpretative in context versus generalization across contexts." Consequently, we believe that the indepth study of particular professional work environments as a means to effective instrument development need to preceded the task of developing an instrument capable of more universal application.

In conclusion, we would reiterate that the data presented in this study do support the thesis that technical task environments vary along dimensions that are independent of job holder interaction and that technical task environments can be meaningfully measured in terms of the variance in degree to which they are affectively, perceptually, symbolically, and behaviorally oriented.

E. On the Need for a Congruent Model of Person-Environment Interaction to Understand Personal Effectiveness in Organizations

Ronald E. Fry and Ronald Sims*

Introduction. A primary theoretical focus of the research being reported in this volume is on the relationship between individual learning styles and the press for continued application of these styles to learn in the context of work. One intended outcome of our studies is the development of frameworks and methodologies to measure both individual and job differences in ways that lead to useful understanding of person-environment interactions. In reaching this objective, we have had to deal with the dilemma of commensurability between measures of person and environment. This paper speaks to that dilemma and the frameworks and measurement systems that have emerged to help further our understanding human behavior in the context of work.

First we will develop the concept of person-environment interaction to highlight the need for commensurability. Then we will discuss the construct of adaptive competency as a means to operationalize a model of P-E interactions. Finally, we apply the model to demonstrate its usefulness in exploring and understanding the nature of match and mis-match between person and environment.

Definition of the Environment.** We believe, in the tradition of Lewin, that human begins act in accordance with perceptions and belief systems formed in the interaction with their environments. As discussed in Section V-B, these environments include not only the immediate settings containing the developing person, but also the social contexts in which these settings are embedded. Bronfenbrenner (1977) terms this perspective the ecology of human development, which he defines as the scientific study of the progressive mutual accommodation throughout the life span between a growing human organism and the changing immediate environment in which he lives. The ecological environment is conceived topographically as a nested arrangement of structures, each contained within the next. The successive levels of this topography are: (1) the microsystem, described as the complex of relations between the developing person and the environment in an immediate setting containing that person. The essential elements of a microsystem are the factors of time, place, physical features, activity, participant, and role; (2) meso-system, as the prefix implies lies midway between the person in his immediate setting and the institutional structures. The meso-system comprises the relationship among the major settings, containing the developing person at a particular point in his life; (3) exo-system, is seen as an extension of the meso-system embracing other specific social structures, both formal and informal, that do not themselves contain the developing person, but impinge upon or encompass the immediate settings in which that person is found: therefore influencing, delimiting, or even determining what goes on there; (4) the macro-system, refers to the over-

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**This discussion is edited from Griggs, 1981.

arching institutional patterns of the culture or subculture, such as economic, social, educational, legal, and political systems of which micro-, meso-, and exo-systems are the concrete manifestations. This concept of nested environments provides a functional definition of the term environment. Its functionality lies in the fact that it allows us to differentiate those aspects of a person's environment which are proximal, or distal, primary, or secondary, and which have short term versus long term impact. In this context, then, environmental press refers to the complex forms of experience and information input from the environment which influence, change, or reinforce the individual's attitudes, beliefs, perceptions, and ways of responding to the task and role demands of his position in the organization. Our major focus here will be on the micro-meso contexts of one's work environment, what we would typically view as his or her job or role in some larger organizational context. While we do not ignore the other contexts in Bronfenbrenner's scheme, we have assumed that their impact, at any point in time, is of a historical nature in helping to form the inherent styles of the individual (i.e., professional mentality) and certain overarching aspects of the specific work situation (i.e., nature of routine work in automation). These effects are assumed to be secondary forces acting on the person-environment interaction. If we can understand the interaction between observable individual styles and observable micro and meso environmental demands, then we will also be viewing the impact of these more distal environments.

Models of Person-Environment Interaction. That behavior creates environment or that environment determines behavior are positions both highly deterministic and advocated in the extreme by humanists on the one hand, and behavioralists on the other. The former contend that individuals determine what they become by their own free choice, while the latter contend "a person does not act upon the world, the world acts upon him." Since both of these extreme positions are inadequate in terms of explaining the complexity of human behavior, the conceptual accommodation offered by a more interactive model is appealing. Lewin's classic formulation (B = f (P, E) seeks to recognize both the influence of personal predispositions (instincts, drives, traits, and other motivational forces) and the influence of environmental forces on behavior. While this interactive conception recognizes personal and environmental influences as bi-directional, it still retains a uni-directional view of behavior, that is, behavior is treated as a consequence, not as an element in causal process. The conceptual weakness in this accommodative model is that it postulates another form of determinism. The imagery evoked is that of persons as repositories of programs avilable to respond to various stimuli received from the environment. The output of the programs, in turn, has some influence on the source of nature of the stimuli. This may be an improvement on the previous limited models of unidirectional influence of either the person or the environment, but it is still not adequate. What is missing is what social learning theorists (e.g., Bandura, 1978) recognize as the triadic relationship among the elements: behavior, person, and environment.

This triadic relationship recognizes behavior as both a consequence and a causal element in the person's transactions with the environment. The model of behavior in which personal predispositions and environmental influences are conceived of as interlocking determinants of each other, recognize that not only is a person's behavior influenced by the environment, but also the environment is shaped by the person's behavior. This triadic interdependence is easily demonstrated by an example common to professionals at work. In engineering work it is not uncommon for an engineer to receive an assignment and after an initial analysis of the data, ask for a redefinition of either the scope or the constraints imposed by the original definition of the task. Applying the transactive-adaptive model of traidic interdependence, we could view the series of interactions in the following way: An engineer (the person) receives an assignment from his superior (the element of his environment), carries out an initial investigation (behavior), requests and is granted a change in parameters (influences his environment) and redefines a more appropriate behavioral response.

This hypothetical series of events demonstrates that all three elements (behavior, person and environment) are changed as a result of interdependent interaction. For the sake of simplicity, this example assigned equal weight to the relative influence of each set of interlocking factors. In other instances one set may dominate if, for example, the engineer had encountered an unyielding environment (supervision), the outcome and necessarily the direction and degree of influence among the three sets of factors would have been different.

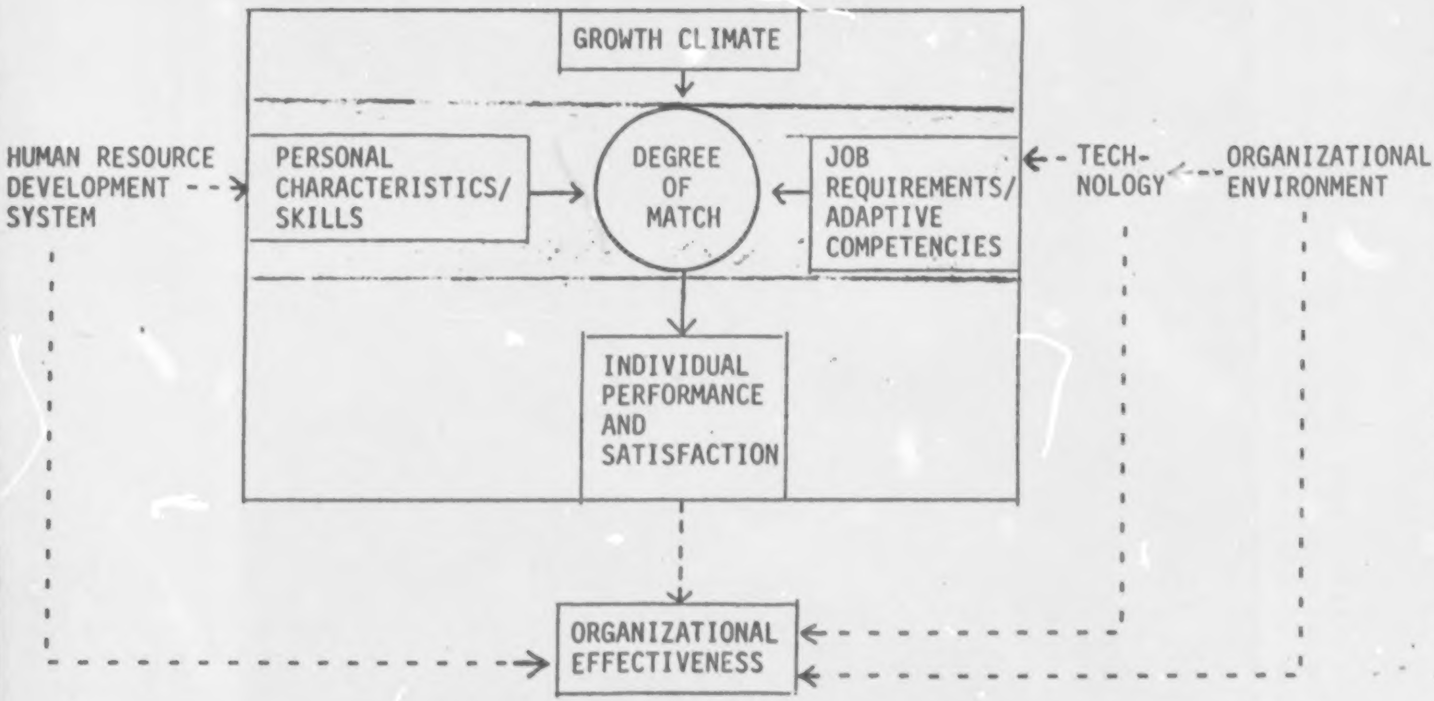
The reality of work as experienced by most professionals validates the notion that persons do change over time as a result of their experiences and that this change, appropriately conceived of as learning, acts as a determinant of change in one's behavior, which, in turn, causes changes in the environment. The diagram in Figure 5-7 illustrates this model in a work setting. For a person in a job, the micro-meso contexts of the environment interact constantly with that person's personal characteristics/skills to produce behavior, the interactive effect. The secondary influence of other exo-macro contexts upon this effect are represented in the diagram. The effect, itself, is characterized in terms of "degree of match" between person and environment, evidenced as behavior that, in turn, influences the nested environmental contexts and future interactions.

Hence the researcher's task vis-a-vis the study of people at work is to employ conceptual models which, at a minimum, comprehend the three elements as well as the products of their relationship.

The Need for Commensurability. In spite of the intuitive appeal of such formulations as Lewin's B = f(P,E), or Bandura's concept of reciprocal determinism, the major obstacle in dealing with interactive effects has been the difficulty of conceptualizing and measuring both person and the environment in commensurate terms. To satisfy the need for commensurability, a model is needed which would describe the personal variables and environ-

FIGURE 5-7

A Model for Person-Job Match to Organizational Effectiveness


HUMAN RESOURCE DEVELOPMENT SYSTEM
GROWTH CLIMATE
PERSONAL CHARACTERISTICS/ SKILLS
DEGREE OF MATCH
JOB REQUIREMENTS/ ADAPTIVE COMPETENCIES
TECH-NOLOGY
ORGANIZATIONAL ENVIRONMENT
INDIVIDUAL PERFORMANCE AND SATISFACTION
ORGANIZATIONAL EFFECTIVENESS

Source: Sims, 1981.

mental variables within one classification scheme. For example, if cognitive style is our conceptual framework for discussing personal variables, then an equivalent term for environmental variables must be developed. There have been encouraging approaches in educational research to do just this. Schroder, Driver and Stueffert (1967) use an information model to predict the optimal combination of environmental complexity and the integrative complexity of the person. Hunt (1972, 1973) used this concept of "environmental complexity" in studies of junior high school students in order to discover meaningful P-E interaction effects. In these cases, the personal variables (P) was the student's cognitive orientation or conceptual level (CL) measured by paragraph completion tests. A CL index was created which correlated with standard intelligence tests, academic achievement scores and personality variables. Education treatments (E) were differentiated according to the degree of "structure" (Harvey, Hunt, and Schroder, 1967). The measures of degree of "structure" were information load, information density, rate of information change, amount of punishment and reward. Hunt's basic thesis that low CL learners need and perform better in high structure environments (lectures and teachers' centered question and answer sessions) has been supported by other research: McLachlan's (1969) study of high and low CL students in lecture versus discovery oriented art appreciation classes; Tomlinson's (1969) study of the different effect of rule-example ordering on low and high CL students trying to learn Festinger's principle of cognitive dissonance; and Tuckman's (1968) study of the interactive effects of learner CL with non-directive teachers (low structure) and directive teachers (high structure) (Fry, 1978). While the results of this approach to deal with the problem of commensurability are encouraging, the problem remains that in these studies the measure of structural (environmental) variables was vague and the measures of personal variables too encompassing (Kolb, Fry, 1975). For example, the concept of conceptual level (CL) contains several theoretically based but interdependent factors: motivation, cognitive ability maturity, value sophistication, etc. The measures of structure are subjectively derived from general distinctions between degrees of information load, information diversity, and rate of information change.

Rather than cognitive style, we believe that Experiential Learning Theory (see Section IV-A,B) provides a more useful framework with which one can view person and environment in commensurate terms. The basis for this view is that learning, adaptation and problem solving processes are similar and that all jobs have learning, adaptation, and problem solving in common. Therefore if we can describe both the adaptive skills which the person posseses and those the job requires in learning terms we can identify the key aspects in our P-E model and describe the adaptive or interactive process that occurs.

Experiential Learning Theory conceptualizes the learning process in such a way that differences in learner styles and corresponding learning environments can be identified. Briefly, the theory contends that an effective learner needs four different abilities--concrete experience (CE) skills, reflective observation (RO) skills, abstract conceptualization (AC) skills, and active experimentation (AE) skills. That is to say that the learner must be able: 1) to get involved fully, openly, and without bias in new experiences; 2) to reflect upon and interpret these experiences from different perspectives; 3) to create concepts that integrate these observations in logically sound theories; and 4) to use these theories to make decisions and solve problems leading to new experiences. These generic abilities encompass specific skills (see Section IV-A).

The application of this learning model to P-E interactions in work settings is not straightforward. Jobs are most often portrayed in one set of terms (i.e., job specifications), while individuals are thought of in another set of terms (personal trait characteristics). To achieve a commensurate means of assessing person and environment factors, then, we propose two critical assumptions:

1) That the person or role incumbent be viewed as an adult learner, and

2) That the job context be viewed as a learning environment where job performance necessitates some type of cycling through the Experiential Learning Theory process.

Viewing the Person as a Learner. Before joining an organization or taking a new job every individual already possesses characteristics which identify him as a particular kind of learner or particular kind of specialist resulting from his/her educational training or vocational specialization. Previous research has shown that on the basis of educational experiences, individuals enter organizations with a particular learning style (Altemeyer, 1966; Kolb and Fry, 1975; Plovnick, 1976; Manring and Griggs, 1978; Miller, 1978; and Sims and Gypen, 1980).

Individuals develop with different patterns in needs, values, and perceptions. It must be understood that these patterns continue to develop as persons encounter new experiences wrought with new problems. Each individual has unique characteristics based on experience, education, and innate talents or predispositions. It is important to understand that individuals bring their differences in personal characteristics into an organization, and their personal characteristics develop as they strive to master their external world. The patterns of needs, values and perceptions which develop into any personality system are the products of an interaction between biological characteristics and lifelong psycho-social developmental experiences (Jung, 1921; Kolb, 1981). This means that while all individuals strive to solve the problems confronting them, different experiences lead each individual to develop--or learn--differently. This process continues even in adult years. In adulthood, however, the need to maintain internal balance gives growth and developmental process a more self determined direction.

As an individual strives to master problems, certain behaviors tend to be consistently rewarding; that is, certain behaviors provide solutions to problems facing the individual. Consequently, the next time the individual needs to solve a similar problem he tries the same pattern of behavior again. As a result of this conditioned learning process, different individuals develop different personal learning habits, or what Kolb (1971) calls learning styles. Kolb identifies four different learning styles - Accommodator, Diverger, Assimilator and Converger. (For a more detailed description of these learning styles see Kolb, 1981.)

Viewing the Job as a Learning Environment. Consider the job as a learning environment which may facilitate, inhibit, or impede individual feelings of competence, satisfaction, or value placed on work. Given this perspective, the present framework is most concerned with subjective apprehensions and evaluations of individuals, and the requirements of their jobs, i.e., how jobs are perceived and experienced (Pervin, 1968; Stern, 1970).

Like individuals, jobs develop as distinct entities or develop a distinct "press" (see Section V-B). Research by Fry (1978) has shown that learning environments can be viewed as having certain objective characteristics or demands which are independent of what a learner does, or should do, in the environment. These characteristics reflect the nature of the job: supervisory relationships; opportunities for feedback; type of interdependence required; type of information dealt with, etc.

Any job can be viewed as having degrees of orientation toward each of the four learning modes in the experiential learning model. Fry examined the relationship existing between differing learning styles and environmental variables in the context of a graduate school of architecture. Four distinct, classroom orientations or environmental presses were hypothesized based on an extension of experiential learning theory. These orientations and their corresponding modes vis-a-vis Kolb were: Affective orientation, which corresponds to concrete experience; Perceptual orientation, which corresponds to reflective observation; Symbolic orientation, which corresponds to abstract conceptualization; and Behavioral orientation, which corresponds to active experimentation. These four orientations connote the overall climate or environmental press they create and the particular learning skill or mode they require. Knowledge gained from Fry's research led Fry and Kolb (1979) to suggest a common set of "adaptive" competencies that characterize a job in a work setting and relate to learner styles. Table 5-20 lists these competencies and groups them according to the particular learning mode they correlated with in the Experiential Learning Model. The empirical relationship between the person and job can thus be derived by measuring the personal characteristics and job demands in learning terms via Experiential Learning Theory.

TABLE 5-20

Adaptive Competencies that Link Job Demands and Personal Learning Orientations

An Affectively oriented Environment (Job) Requires one to . . .	Be personally involved Deal with people Be sensitive to people's feelings Be sensitive to values	Learning via Concrete Experience skills enables one to . . .
A Perceptually oriented Environment (Job) Requires on to . . .	Gather information Organize information	Learning via Reflective Observation skills enables one to . . .
A Symbolically oriented Environment (Job) Requires one to . . .	Experiment with new ideas Create new ways of thinking Generate alternate ways of thinking and doing Analyze quantitative data Design experiments Test theories and ideas Build conceptual modesl	Learning via Abstract Conceptualization skills enables one to . . .
A Behaviorally oriented Environment (Job) Requires one to . . .	Seek and exploit opportunities Commit yourself to objectives Make decisions Set goals	Learning via Active Experimentation skills enables one to . . .

The derivation of this list was the result of linkage and factor analysis. For more details, see Section IV-C in this Report.

Adaptive Competency: The Link Between Person and Environment. As Table 5-20 indicates, we can measure personal characteristics and job demands in commemsurate terms by linking the two via the construct of adaptive competence. This is the behavior factor in our Person-Environment model presented earlier. The effective matching or application of personal skills to meet/satisfy job demands reflects a process or adaptive competence that is evidenced via some behavior. This concept of adaptive competence represents a new approach to the improvement of performance by seeking to match or fit persons to jobs through understanding those particular adaptive competencies that are appropriate to the given job or situation. Previous approaches emphasized the measurement and selection of personnel by generalized aptitude tests. These have proved a dismal failure in spite of heroic efforts to make it succeed (see Tyler, 1978, Chapter 6 for a review). The basic problem of the aptitude testing approach was that aptitudes were too generalized and thus did not related to the specific tasks in a given job, producing low correlations between the aptitude and task measures that often were not commensurate, i.e., they did not measure the person and the task in the same terms.

The competency assessment approach implied in our model focuses on the person's repetoire of skills as they relate to the specific demands of a job. Tyler summarizes two major advantages of this approach:

> For one thing, competencies cut across boundaries. Instead of assessing intelligence and achievement in school children, skills in job applications, and symptoms in psychiatric patients, we can examine what each person in any of these categories can and cannot do. One can capitalize on the developed competencies and set up situations in which competencies not now present can be acquired, whether these are basic educational competencies, occupational competencies or intrapersonal competencies. The competency approach thus provides individuals and their helpers with clear guidelines as to what to do next.
>
> Another potential benefit is the generation of the concept of complementarity to supplement the concept of competitiveness so prevalent in modern society. Competencies represent a completely different way of structuring our perceptions of others. The more competencies other people have the better for each of us, and it is essential for the functioning of complex society that individuals develop different repertoires of competencies (p. 104-105).

Toward the Assessment of Person-Job Interactions. The result of using adaptive competency measures to link individual learner style to the requirements of jobs suggests a powerful diagnostic tool to study the match or mis-match between the person and the job. By measuring personal characteristics and job press in the same competency terms, we have a commensurate measure of the person and job relationship. The Competency Circle (developed in detail in Section IV-C) portrays a field upon which measures of both a person's skills and the job's demands can be plotted. (A sample competency circle is reproduced in Figure 5- 8.)

With this kind of data at one's disposal, design changes or training programs could be considered to develop the required individual adaptive competencies to better perform the current job. For example, if a job manager determined that a particular entry level engineer was ready for promotion to a managerial position, he could identify that individual's skills and the skills required to do the new job in commensurate measures. The new job may require competency skills in affective and behavioral areas, but assessment of the person's skills may show that the individual's skills rest in the symbolic area (i.e., abstract learning style). Hence some developmental/training program would be called for to further develop the individual's affective and behavioral skills needed for the individual to effectively perform the new position.

Figures 5- 9, 5-10, 5-11, 5-12, and 5-13 further illustrate how such an analysis would look. Our Alumni Sample of Engineers and Social Workers were surveyed as to their self-perceived competencies and their perceptions of the competencies demanded by their jobs. The resulting sample means for five job types are shown in these figures. If we assumed that these overall averages represent an accurate, generic view of job demands, then in each instance a manager would be able to identify where matches and mis-matches exist. For example, in Figure 5-12, this sample of Technical Managers show that their jobs require more affective and behavioral competencies than they possess. With this information management would see that a mis-match exists between the technical manager's skills and the demands of the job. This could lead to their providing for possible training programs or necessary changes in the task requirements to improve the matching process. Similar information is indicated to the manager of direct service social workers via Figure 5-9 where we find that behavioral skills are needed competencies for performance of the administrative social worker's jobs, but may not be the particular strengths of the incumbents in those positions - who probably come from being "matched? in the highly affective direct service jobs!

Does P-E Match Make a Difference: Some Implications. Through adaptive competencies that are empirically related to both measures of adult learner styles and job press, we are now in a position to assess P-E interactions. Beyond determining the requirements of a job, or personal skills present, however, we can also start to explore the impact of different P-E interaction

FIGURE 5-8

The Competency Circle

Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

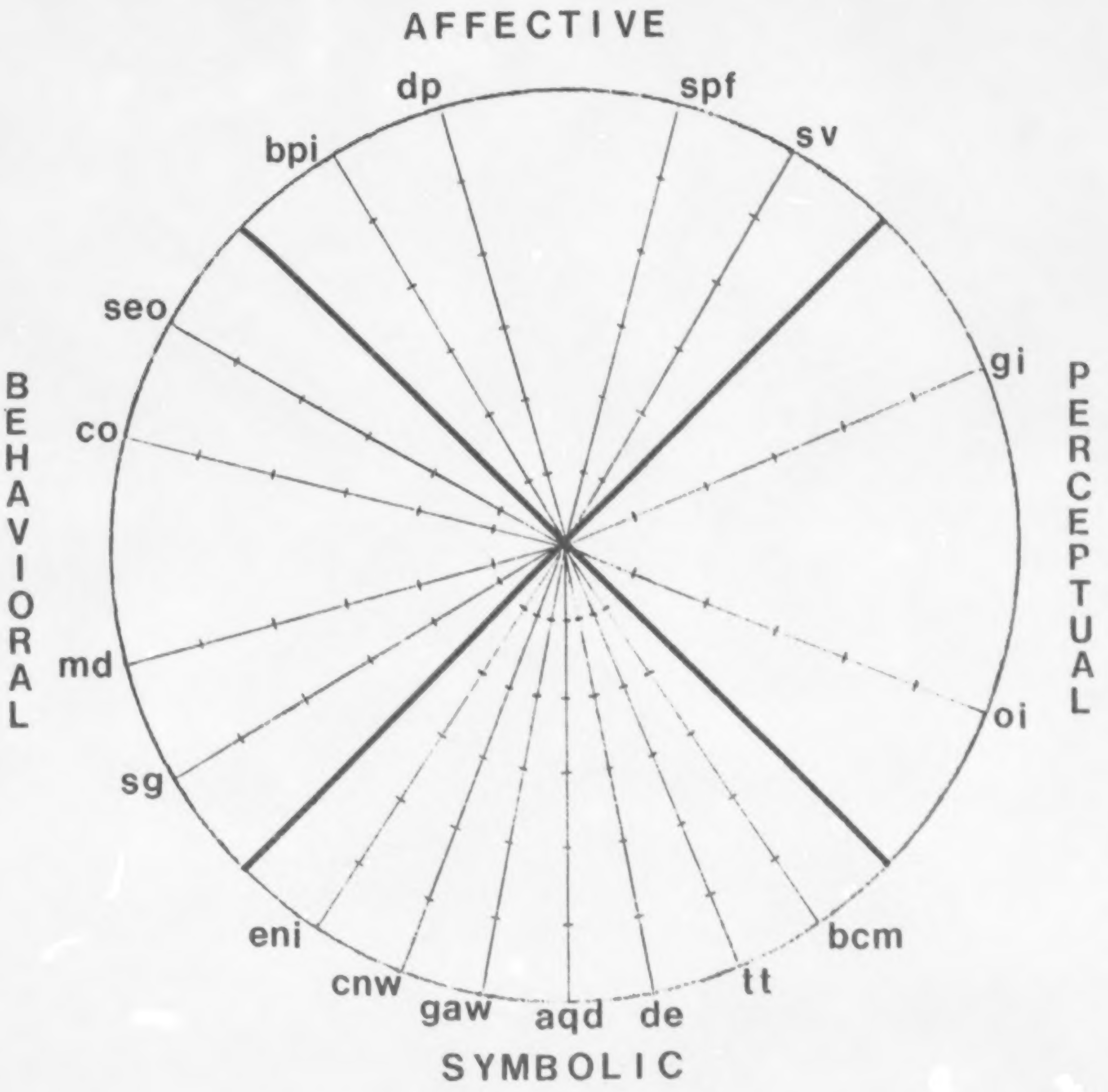
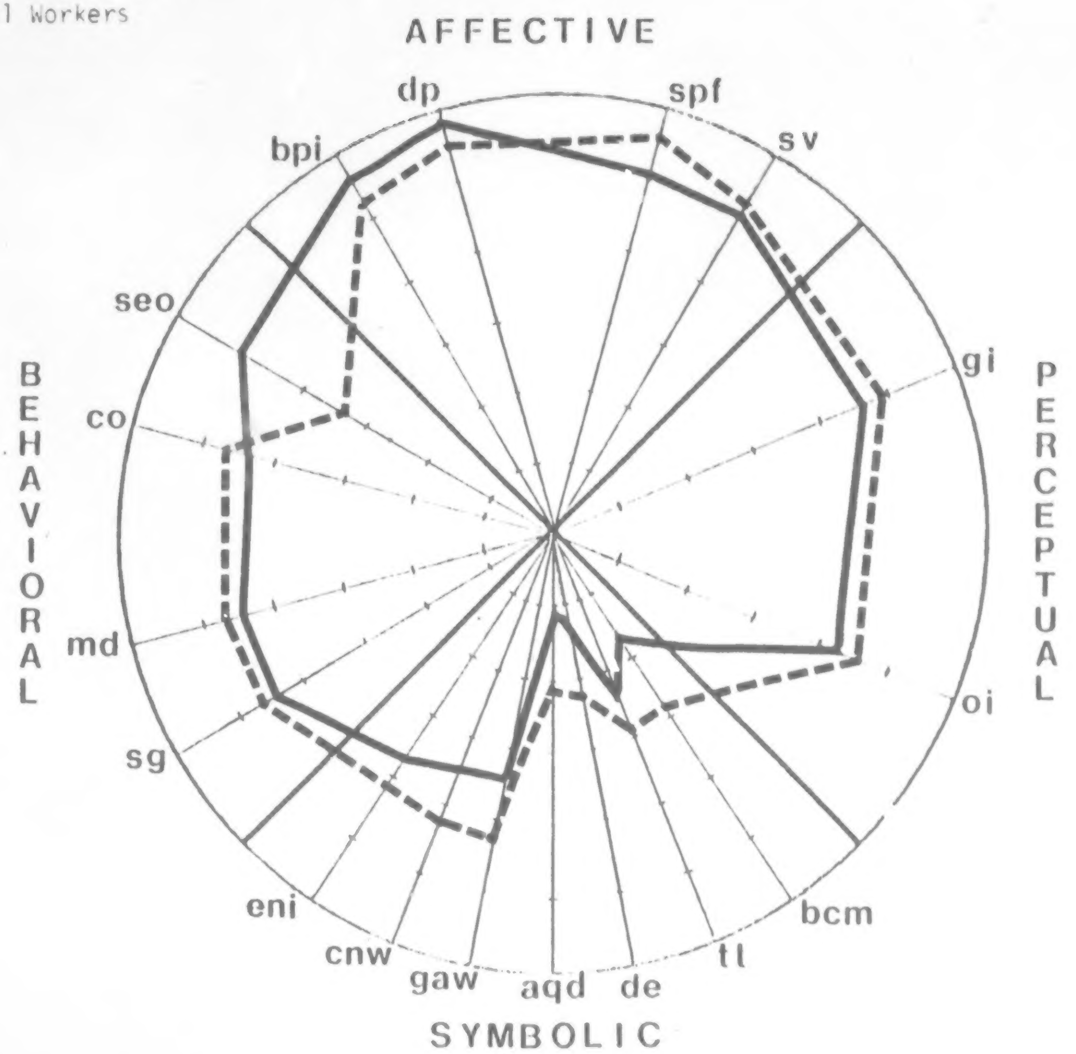

AFFECTIVE
dp
spf
bpi
sv
seo
gi
co
BEHAVIORAL
PERCEPTUAL
md
oi
sg
eni
bcm
cnw
tt
gaw
aqd
de
SYMBOLIC

FIGURE 5-9

Comparison of Job Demands and Skills for Direct Service Social Workers



Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

____ Job Demands

- - - Skills

FIGURE 5-10

Comparison of Job Demands and Skills for Administrative Social Workers

Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

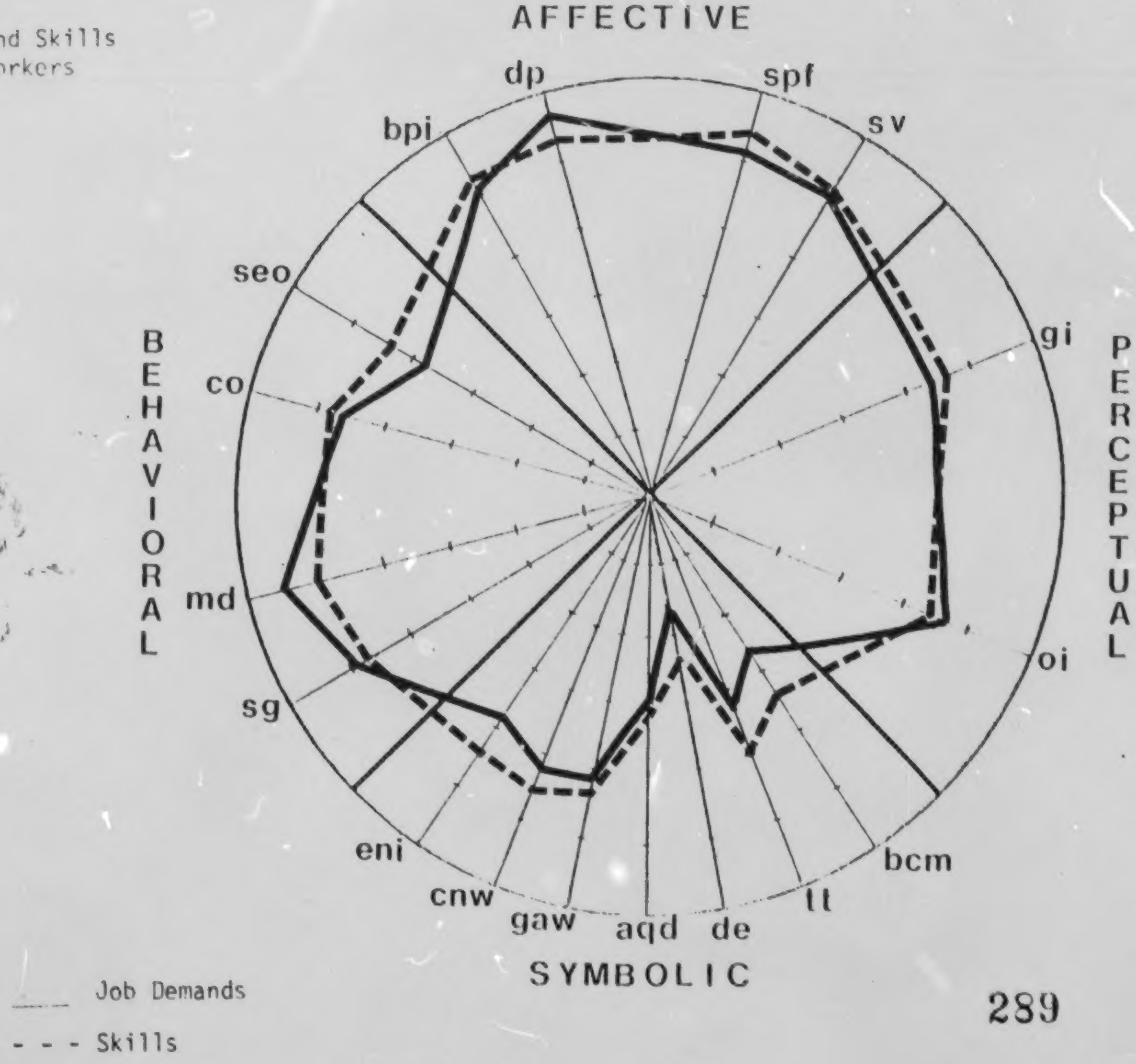


FIGURE 5-11

Comparison of Job Demands and Skills for Bench Engineers

Work Abilities Index

Affectively Related:

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related:

gi	gathering information
oi	organizing information

Symbolically Related:

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

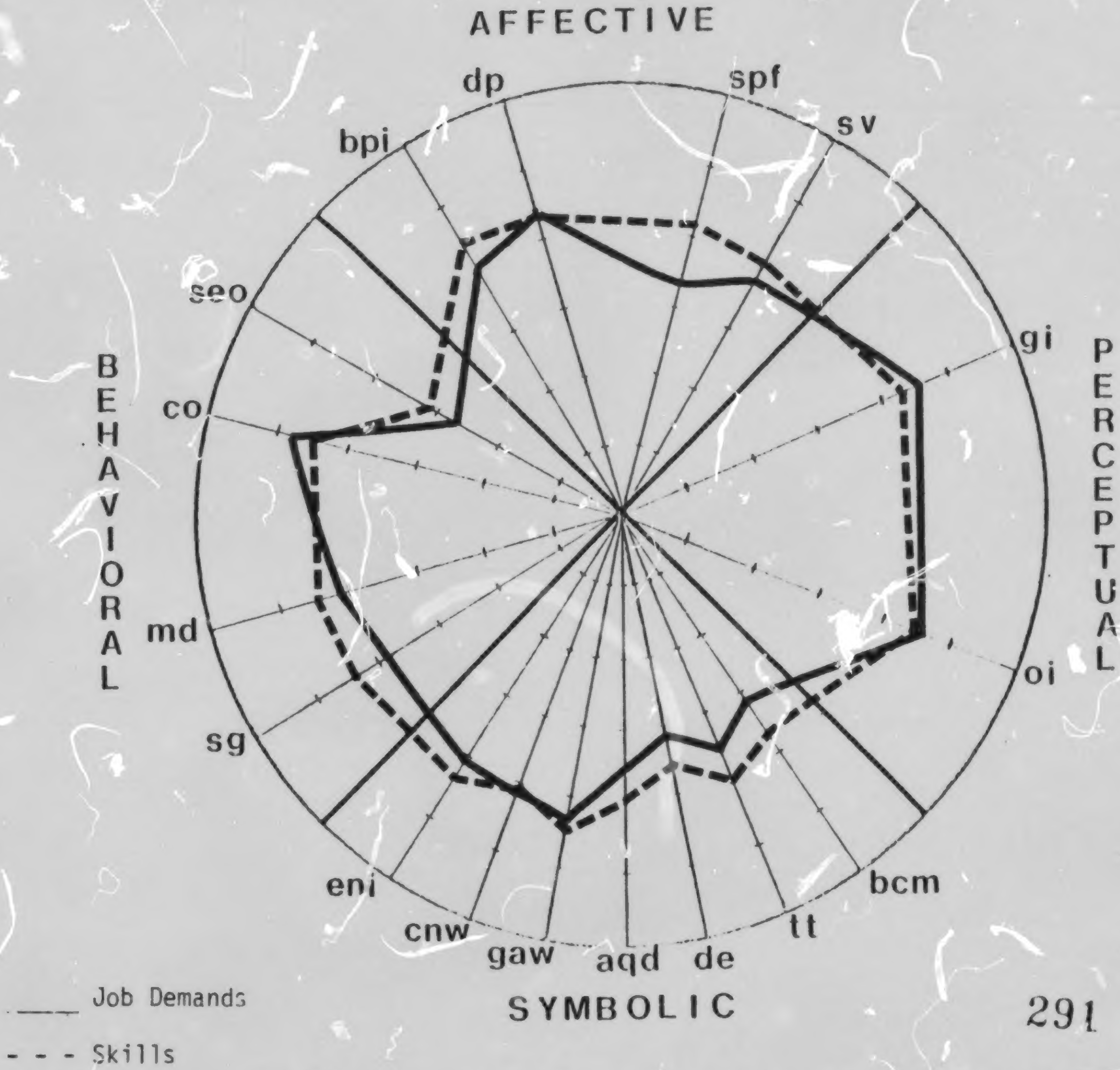


FIGURE 5-12

Comparison of Job Demands and Skills for Technical Managers

Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

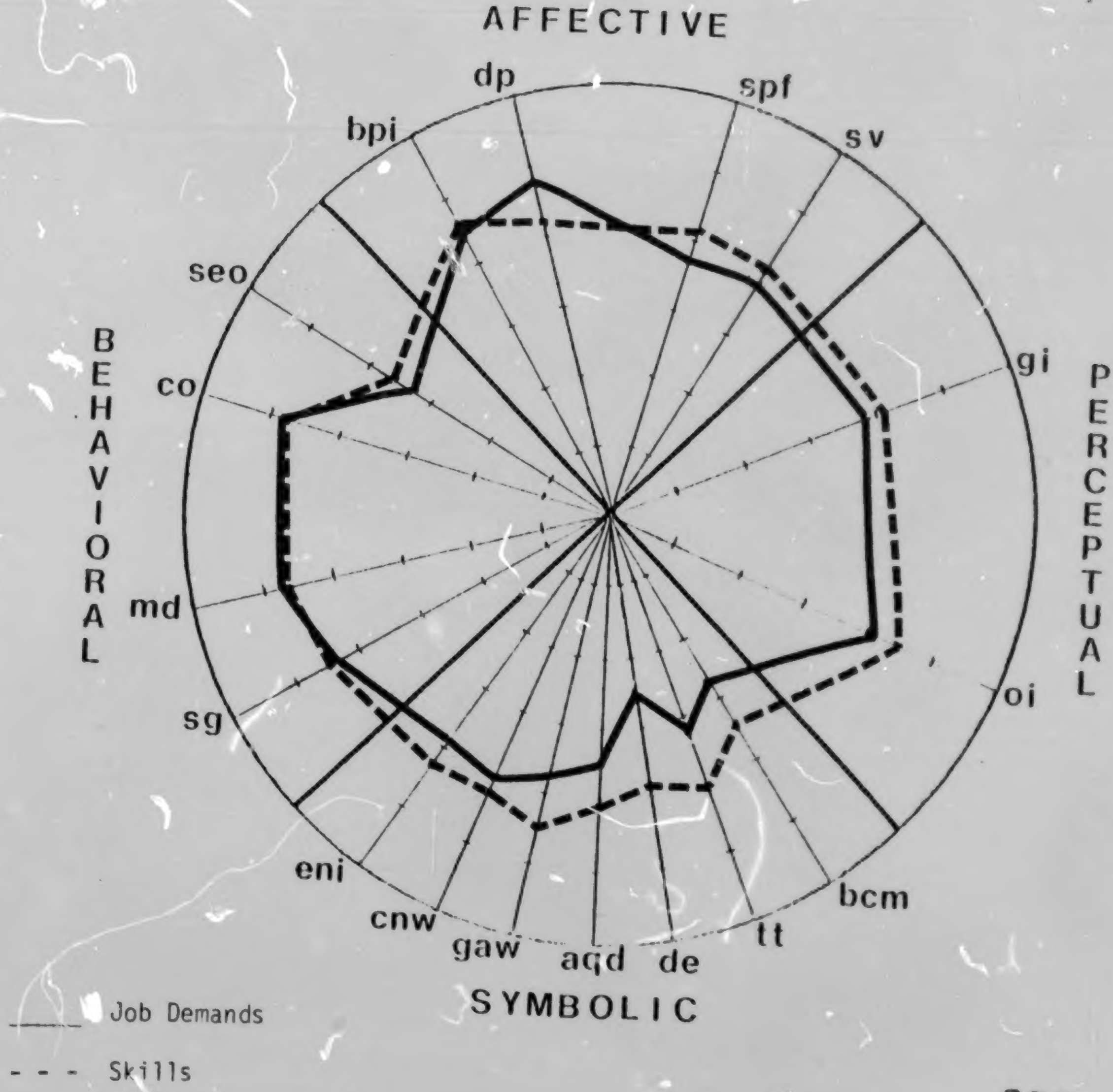


FIGURE 5-15

Comparison of Job Demands and Skills for General Managers

Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

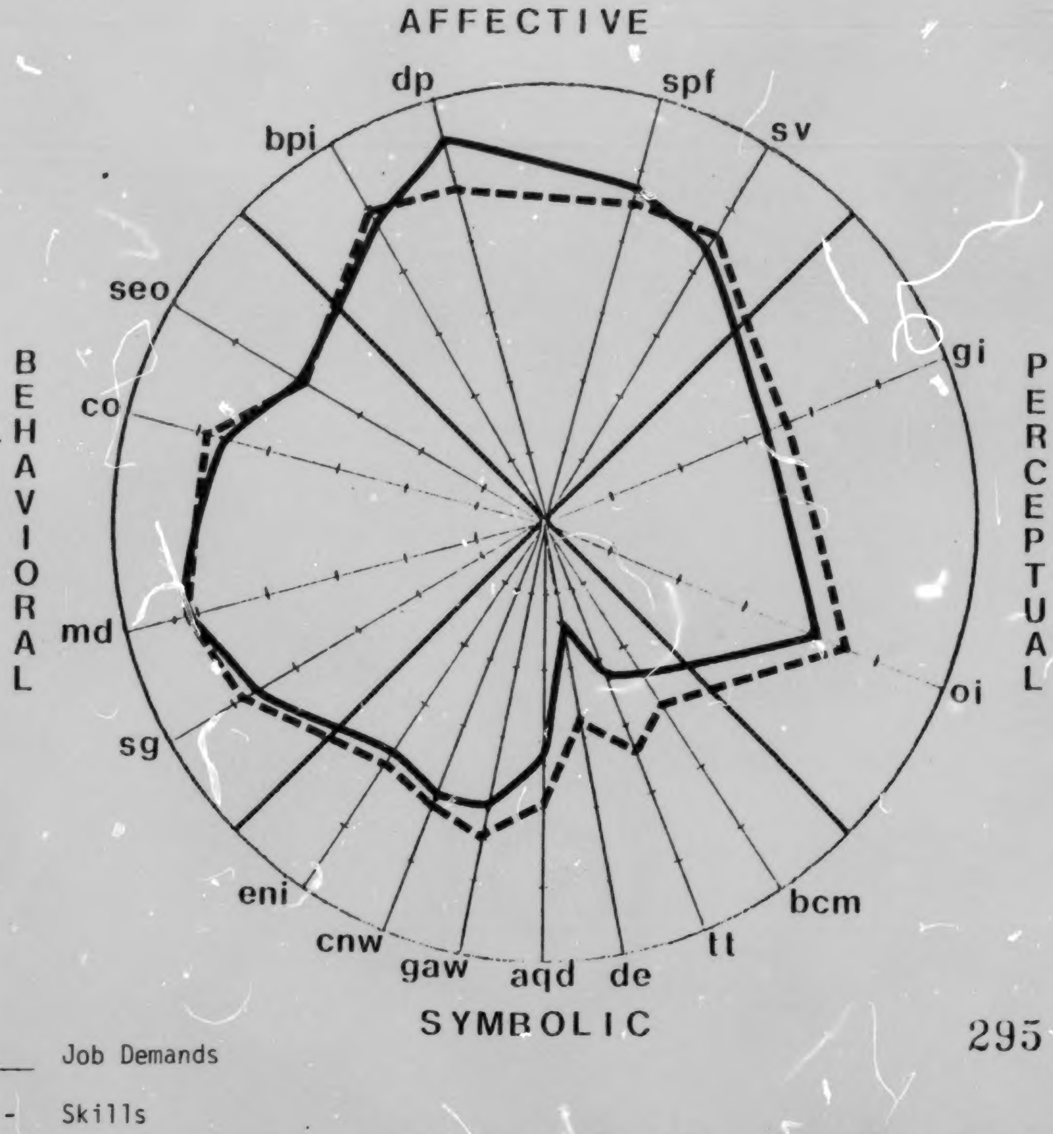
gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals



effects. Does a match between person and environment make a difference? If so, upon what?

Forehand and Gilmer (1964), for example, have discussed the interactions between personalities and job qualities that lead to high organizational efficiency. They have suggested that perhaps too great of a match will prevent change.

> It has some times been suggested that the matching of organizational and individual characteristics would maximize both organizational effectiveness and individual satisfaction. Such a conclusion is suggested by theories and evidence of interactive effects. If the suggestion is implemented mechanically, however, it does not allow room for change, either for the organization or the person. The matching strategy may hinder both the organization and the person from adapting readily to new situations -- the former by the inbreeding of inflexibility, and the latter by the limitation placed on the individual's range or experience (McMurry, 1958).

Another use of the Competency Circle methodology presented in Figures 5-9 5-10, 5-11, 5-12, and 5-13 as a way of diagnosing person-job interaction is in identifying pivotal versus peripheral job demands. Does matching the person and the job in pivotal versus peripheral skill areas have different effects upon individual job performance and satisfaction? Most job requirements attach differing amounts of importance to different skills. Not all skills may be equally important for effective performance of a job. Pivotal skills refers to those skills that a person must possess or learn to effectively perform a job while peripheral skills refers to skills that a person may possess but they have no impact on the performance of the job. Through a greater understanding of the pivotal and peripheral skills of a job one can more effectively match the person and the job and evaluate the impact upon the individual's performance and job satisfaction.

A third issue that can now be more clearly confronted is whether or not mis-matched (over or underqualified) person-job relationships result in different levels of performance of satisfaction. When an individual's skills or competencies exceed the competencies required for effective performance of a job will he or she be different in terms of job satisfaction and performance from the individual whose skills or competencies do not meet the competencies required for effective performance of a job?

A final implication that managers can more clearly address centers on the overall P-E interaction model presented earlier in Figure 5-7: the notion of growth climate. For example, does growth climate have an impact upon the degree of match between the person and the job. Does growth climate serve as the glue or lubricant in enhancing the matching process between the person and the job, or in enhancing the career process of moving from match (success) in one job to mis-match (challenge) in another, to match in that one, etc.?

The studies reported in subsequent Sections V-F and V-G begin to inquire into these and other qeustions through the use of the commensurate model developed here.

F. Assessing Person-Environment Interactions: The Impact of Match Between Person and Job Characteristics in Technical Work Environments

Susan L. Manring

Introduction. Once the technically-trained professional begins to work in an industrial organization, the individual is confronted by organization-socialization processes. The individual both acts--as a technically-trained professional--and is acted upon--by the "press" of organizational definitions of the professional (in our case, engineering) role and job requirements. We thus regard career development of engineers as a process over time through which one's identity is mediated by the interaction between environmental press in the organization setting and one's personal attitudes, values, and predispositions.

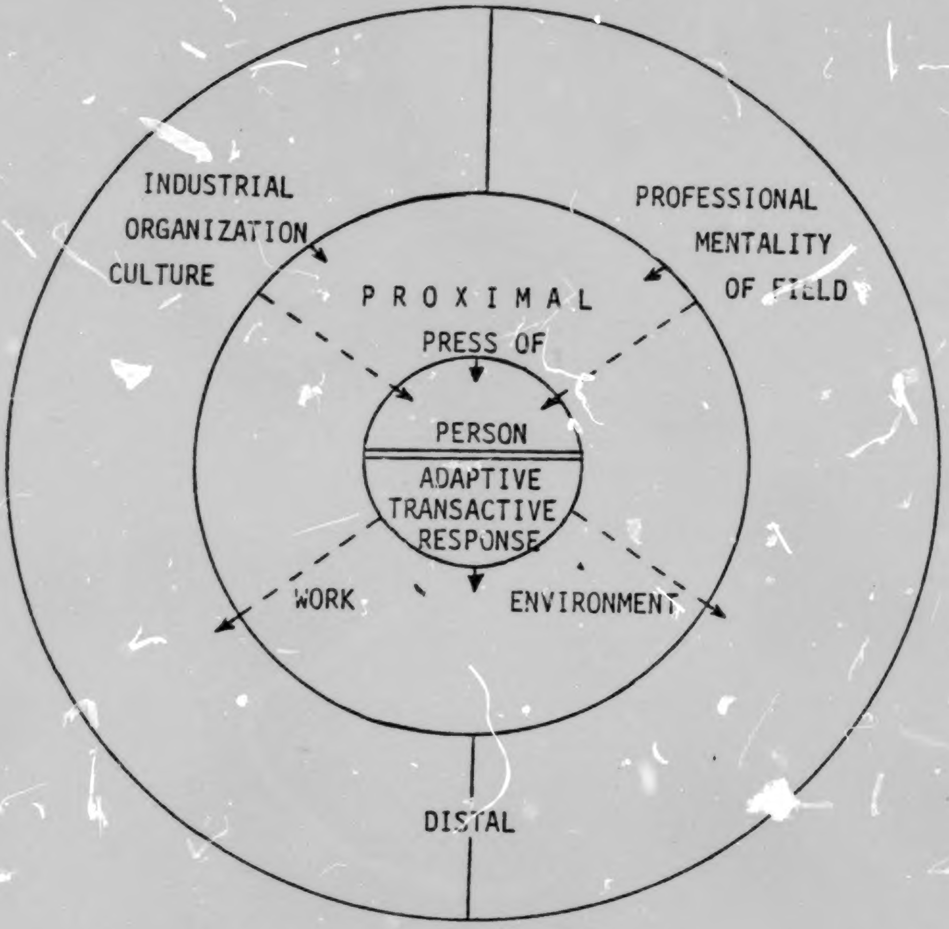
Our interest in this study is to understand more about the nature of these person-job press interactions. Particularly, we are seeking to examine the consequences of person-environment match or mis-match in technical work environments. What is the impact upon the person when his/her personal orientation(s) is suited to the demands of their job? Does such a "match" result in better satisfaction, less alienation, etc. than would some type of mis-match?

A Model of Person-Environment Interaction. The investigation of the above kinds of questions necessitates an explicit framework or model of person-in-context; one that can be measured or assessed in commensurate terms (see Section V-E). Figure 5-14 shows the person in the center of our person-environment interaction model. The work environment is drawn as the proximal setting around the individual. The third sphere--the distal setting--represents both professional mentality, a pervasive ideology which is incorporated by individuals as a result of their professional education, and the industrial organization culture. The latter signifies another ideology that is also incorporated, through organization socialization processes, but may be at odds with one's professional identity.

In a sense, an engineer's career pattern, over time, is the individual's very particular adaptive-transactive response to the industrial organization. We also view the development of engineering careers as a comment--on the organizational use of technically-trained professionals--addressed to the industrial culture and the engineering field, which in our model constitues the distal sphere. This distal sphere represents the macrosystem in which the work organization and the individual are "nested" (Bronfenbrenner, 1977). Viewed from this broad perspective, person-environment interaction leads to career development which "entails an appreciation for the manner in which institutions channel and guide people through their working lives" (Van Maanen and Schein, p. 38).

FIGURE 5-14

Person-Environment Interaction Model


INDUSTRIAL
ORGANIZATION
CULTURE
PROFESSIONAL
MENTALITY
OF FIELD
PROXIMAL
PRESS OF
PERSON
ADAPTIVE
TRANSACTIVE
RESPONSE
WORK
ENVIRONMENT
DISTAL

In order to better understand individuals' interactions with their institutional context, this study incorporates measures of job and role presses which are commensurate with measures of adult learning processes. As discussed in earlier studies, these learning processes represent four areas of adaptive competence: concrete experiencing, reflective observing, abstract conceptualizing, and active experimenting.

Griggs (1979) has translated these adaptive personal competencies into four corresponding indices of job press: affective complexity, perceptual complexity, symbolic complexity, and behavioral complexity (also see Section V-D). Figure 5-15 shows how the environmental presses correspond to the learning modes. Each dimension of job press is measured in terms of complexity for the following focal issues:

1) All jobs have some degree of variety which varies both in intensity and kind.

2) Jobs present different kinds and intensity of challenge to people.

3) Jobs often vary considerably in the kind of information dealt with (e.g., volume, form, complexity, and source, etc.).

4) The relative scope of particular jobs varies in terms of depth and breadth of tasks, as well as the degree to which they are whole (integrated) or fragmented.

5) Jobs can be characterized by the degree to which they involve the application of knowledge; e.g., relating to people, creating new approaches, applying theoretical frameworks, or using one's experience and skills.

Affective Environments are characterized by:

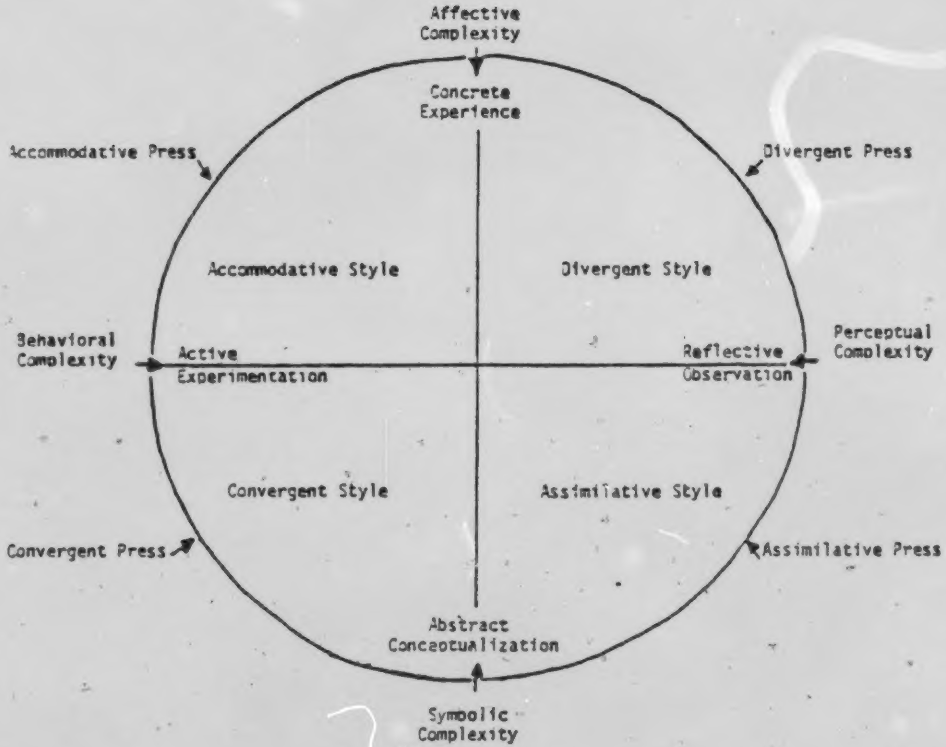
- Variety of contacts with different people.
- Challenge to get along with people.
- Information which is current, immediate, timely, e.g., ideas, feelings, values.
- Scope of exposure to emotional issues with other people.
- Awareness of the feelings, values, and ideas of others.

Perceptual Environments are characterized by:

- Variety of viewpoints in analyzing problems.

FIGURE 5-15

Environmental Presses as They Correspond to
Experiential Learning Styles


Affective Complexity
Concrete Experience
Accommodative Press
Divergent Press
Accommodative Style
Divergent Style
Behavioral Complexity
Active Experimentation
Reflective Observation
Perceptual Complexity
Convergent Style
Assimilative Style
Convergent Press
Assimilative Press
Abstract Conceptualization
Symbolic Complexity

- Challenge of learning new ways of how things relate.
- Information which focuses on the process of how something is done.
- Scope of perspective on probable impacts and consequences of decisions.
- Observing or reflecting on how elements function together.

Symbolic Environments are characterized by:

- Variety of symbolic tools, e.g., mathematics, theories, computer simulations.
- Challenge of being current on technical and theoretical techniques.
- Information which is abstract.
- Scope of technical aspects of projects.
- Solving problems through theoretical and analytical skills.

Behavioral Environments are characterized by:

- Variety of activities, e.g., planning, scheduling, negotiating for resources.
- Challenge of developing wider range of skills, e.g., to lead projects, negotiate with suppliers.
- Information which focuses on the progress of a task or activity.
- Scope of activities, all of which require tracking.
- Applying skills, education and experience to get things done.

(Source: Griggs, 1979)

For the most part, the engineer role presses for symbolic and behavioral complexity (Sims, 1981, also Section V-E). Engineers are called upon: To deal with the technical aspects of projects; to solve problems using their analytical skills; to be able to use a variety of symbolic tools; and to remain current with new techniques. Engineering jobs press for behavioral complexity in terms of the demands of many projects, including monitoring the progress of task activities and meeting deadlines. Engineers are also pressed to develop an ever-wider range of skills and to apply skills and experience to accomplish tasks.

The converger adaptive style, which combines the active and abstract learning modes, is an appropriate match for most engineer role and task demands. This learning style serves well to equip one for the activities outlined above. However, over time, the converger style may become disjunctive for a person in coping with the complexity of organizational life, particularly to the degree it predominates the person's adaptive style. Similarly, the predominance of a convergent press may tend to confine the individual to a too-narrowly defined specialization. Thus, it is important for individuals to experience a critical degree of job press along all dimensions of environmental complexity.

In order to understand how technically-trained professionals perceive and experience their task demands, we have analyzed each dimension of job press-learning style "match" implied in Figure 5- ; e.g., symbolic press with abstract style; behavioral press with active style; and affective press with concrete style.*

The consequences to the person of match or mismatch in the above interactions are measured in terms of level of job satisfaction, role-related tensions, alienation from one's own career development, and commitment to remain with the company. In terms of our model (Figure 5- then, we are focusing in on understanding the adaptive-transactive response to a fit or misfit of personal adaptive competencies to job press demands. For the time being, we are holding constant the independent effects that professional mentality and organizational culture might have on this response. It is assumed that they have an inherent interactive effect on the overall nature of job press (from organizational culture) and the individuals' personal orientations (from mentalities formed in professional education).

Methodology. Ninety-one managers and engineers were surveyed in two engineering firms. A breakdown of the sample by job title and description of sites is included in Section III-D, since this study was part of a larger one including instrument development and interviewing.

The job-press of the respondants was measured via Grigg's (1979) first version of the Environmental Press Inventory, using the indices he analyzed as most valid indicators of affective, behavioral, and symbolic press (see Section V-D). In addition, selected items were taken from the Job Characteristic Index created for the Alumni Study (Section IV) and correlated with particular learning styles (see discussion of Competency Circles, Section IV-C).

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* The perceptual press-reflective style analysis was dropped from this study because of our lack of confidence in the measure of perceptual press which was available at the time.

The combined battery of questions used to measure perceived job press is shown in Appendix M.

The major person characteristic under study here is one's learning style which was measured via Kolb's Learning Style Inventory (described earlier, Section II and IV-A).

Each of three particular person-environment interactions were then analyzed;

1) Symbolic press with abstract learning/adaptive style

2) Behavioral press with active learning/adaptive style

3) Affective press with concrete learning/adaptive style.

We were particularly concerned with these interactions because they represent the person-environment fits or "matches" that we would predict from experiential learning theory, as discussed in the previous Section (V-E). That is, a Symbolically-oriented job should demand those competencies related to abstract conceptualization. A match (person competence=job demand) should therefore result in higher performance, etc.

To assess the impact of these three interactions, we considered press-style interaction in relation to three dependent measures:

1) Job satisfaction.

2) Tension associated with being blocked in career development.*

3) Alienation from organizational processes which facilitate career development.

Before beginning the analysis of press-style interaction, the dependent measures will be discussed in further detail:

Job Satisfaction measures, among other things: nature of the task; weight of the workload, job scope, freedom to use personal judgment and initiative; and chance to grow and develop (see Appendix N for the complete measure).

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* Tension from being blocked is the primary source of tension which relates significantly to press-style interaction. Tension from ambiguity and overload were not found to be significant in relation to press-style interactions and are not treated here. As we have indicated elsewhere (Manring, 1979), the issue seems to be more one of "underload" than overload.

Tension from being blocked measures whether one feels progress on the job is what it should be or could be; and whether the individual has enough authority to carry out assigned responsibilities (see Appendix O for questions from which this measure was factored out).

Alienation measures, among other things, whether selection and promotion decisions are discussed openly, and if they are well thought out in relation to career planning; to what degree one participates in establishing the assessment criteria for one's current job performance; and if one is encouraged to express feelings, opinions, and values about task activities (see Appendix P for the complete measures).

The Effects of Symbolic Press ↔ Abstract Style Interaction. A symbolically complex job requires, among other things, the use of a wide range of symbolic tools, theoretical and analytical problem solving skills, creating new ways of thinking and doing, analyzing quantitative data, designing experiments, testing theories and ideas, and continuous updating on new techniques. The corresponding abstract learning mode is characterized by a rational, analytical, logical, and evaluative conceptual style.

As Table 5-21 shows, symbolic press significantly affects job satisfaction, independent of an interactive effect with the abstract learning mode. However, an analysis of high vs. low symbolic press (Table 5-21) indicates a significant difference between high and low symbolic press for those individuals who have a high abstract style preference, which is not found for those less oriented to abstractness. Here we find that job satisfaction increases significantly among high abstract individuals as the symbolic complexity of their job increases. Job satisfaction is lowest for those with a high abstract style who have low symbolic press jobs. We infer that highly abstract people with low symbolic press jobs are among those who are dissatisfied with the level of technical work they called "Kelly Girl-engineering."

There are no significant interactions between symbolic press and abstract style in relation to tension from being blocked in one's career development, or alientation from the organizational processes which facilitate career development. Thus, while low symbolic press negatively affects job satisfaction, it does not seem to inhibit the individual's sense of opportunity for career development in the organization. Neither the degree of tension from being blocked nor of being alienated from one's own selection, performance and promotion activities changes significantly when we compare those individuals with a high or relatively low abstract style in low symbolically complex jobs. Thus, Kelly-Girl engineering, or the trivialization of engineering--which we would expect to be of serious and negative consequence for the development of engineering careers--undermines job satisfaction, but is not a critical source of tension from being blocked or alienation.

TABLE 5-21

JOB SATISFACTION AS A FUNCTION OF SYMBOLIC PRESS--ABSTRACT STYLE INTERACTION

A. Results of Two-Way Analysis of Variance

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main Effects					
Abstract Style	129.444	2	64.722	.724	.999
Symbolic Press	893.335	2	446.668	4.995	.009
2-Way Interactions					
Abstract/Symbolic	462.084	4	115.521	1.292	.280
Residual	6706.946	75	89.426		
Total	8252.891	83	99.432		

B. Mean Job Satisfaction by Symbolic Press and Abstract Style

	Symbolic Press		
Abstract Style	Low	High	P*
High	53.37	64.05	.001
Low	59.57	60.11	.912
P	.142	.322	

*Based on T-Test comparisons.

The Effects of Behavioral Press-Active Style Interaction. A behaviorally complex job requires, among other things, performing a wide-range of activities; seeking and exploiting opportunities; committing oneself to objectives; making decisions; and setting goals. The corresponding active learning mode is characterized by a pragmatic and experimental, "doing" style.

Behavioral press has a significant effect on job satisfaction, independent of an interactive effect with the active learning mode, as Table 5-22 shows. This effect is most striking among those with a high preference for the active learning mode, as Table 5-22 indicates. Thus, job satisfaction increases significantly for high active style individuals as the behavioral complexity of their jobs increase. The pattern among those with a low preference for the active learning mode also suggests that increased behavioral press is more satisfying than less press, although the differences are not as great. The absence of sufficient behavioral press is particularly frustrating to those who adapt through active involvement.

Table 5-23 shows that behavioral press has a substantial effect in mediating tension from being blocked in one's career development that just misses the .05 level of significance. Table 5-23 indicates again that the effect of differences in behavioral press is strongest among those with high active style. Thus, among those with a high preference for the active learning mode, tension from being blocked in one's career development decreases significantly as the behavioral complexity of one's job increases. This same pattern tends to hold but not as strongly for those with a low active style preference.

Behavioral press also has a significant effect on the extent of alienation one experiences in relation to those organizational presses which facilitate career development (Table 5-24). And, as Table 5-23 shows, the press for high behavioral complexity in one's job significantly mediates this source of alienation for both the high and low active style groups.

In sum, the higher the behavioral complexity, the greater the job satisfaction, and the lower the sense of tension from being blocked and the lower the alienation. This is particularly true of those individuals with a high active style preference. Without at least a middle level of behavioral complexity in one's job, the individual tends to feel blocked, unable to move on one's own behalf and uninvolved in one's own selection, performance and promotion activities. Behavioral press thus seems to be associated with access to the reward structure of the organization and the mainstream of organizational activities. Low behavioral press signifies constraint from full, meaningful participation in the life of the organization, which most people feel a need for, and which is especially crucial for those with highly active learning styles.

TABLE 5-22

JOB SATISFACTION AS A FUNCTION OF BEHAVIORAL PRESS--ACTIVE STYLE INTERACTION

A. Results of Two-Way Analysis of Variance

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main Effects					
Active Style	118.622	2	59.311	.744	.999
Behavioral Press	1482.562	2	741.281	9.294	.001
2-Way Interactions					
Active/Behavioral	506.220	4	126.555	1.587	.165
Residual	5982.049	75	79.761		
Total	8252.891	83	99.432		

B. Mean Job Satisfaction by Behavioral Press and Active Style

Behavioral Press				
Active Style	Low	Middle	High	P**
High	48.70	61.67	66.33	.001
Low	56.71	61.81	63.47	.082
P*	.036	.968	.365	

*Based on T-Test comparisons.

**Based on One-Way Analyses of Variance.

TABLE 5-23

TENSION FROM BEING BLOCKED AS A FUNCTION OF BEHAVIORAL PRESS--ACTIVE STYLE INTERACTION

A. Results of Two-Way Analysis of Variance

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main Effects					
Active Style	.006	2	.003	.001	.999
Behavioral Press	12.528	2	6.264	2.933	.058
2-Way Interactions					
Active/Behavioral	6.930	4	1.733	.811	.999
Residual	160.171	75	2.136		
Total	180.036	83	2.169		

B. Mean Tension from being Blocked by Behavioral Press and Active Style

	Behavioral Press			
Active Style	Low	Middle	High	P**
High	3.20	2.46	2.44	.009
Low	2.85	2.75	2.53	.455
P*	.246	.258	.752	

*Based on T-Test comparisons.

**Based on One-Way Analyses of Variance.

TABLE 5-24
ALIENATION AS A FUNCTION OF BEHAVIORAL PRESS--ACTIVE STYLE INTERACTION

A. Results of Two-Way Analysis of Variance

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main Effects					
Active Style	106.117	2	53.058	1.484	.232
Behavioral Press	594.055	2	297.028	8.308	.001
2-Way Interactions					
Active/Behavioral	78.322	4	19.581	.548	.999
Residual	2681.346	75	35.751		
Total	3527.237	83	42.497		

B. Mean Alienation by Behavioral Press and Active Style

	Behavioral Press			
Active Style	Low	Middle	High	P**
High	5.40	4.58	4.25	.003
Low	4.92	4.19	4.17	.035
P*	.176	.251	.784	

*Based on T-Test comparisons.

**Based on One-Way Analyses of Variance.

The Effects of Affective Press-Concrete Style Interaction. Affectively complex jobs require, among other things, being personally involved, dealing with people, being sensitive to people's feelings, and being sensitive to values. The corresponding concrete learning mode is characterized by an intuitive, feeling, and receptive-to-experience style.

Table 5-25 shows that there is a significant main effect of variation in affective press, as well as a significant interactive effect between affective press and concrete style which mediates job satisfaction. And, as we see in Table 5- , this is particularly true among those with a high preference for the concrete learning mode. Thus, job satisfaction increases significantly among high concrete style individuals as the affective complexity of their jobs increase. Among those with a low concrete style, the pattern suggests that a middle-range affective press is more satisfying than either a high or low affective press.

Affective press and concrete style also interact significantly in mediating tension from being blocked in one's career development (Table 5-26 Again, as we see in Table 5- , variation in press is particularly important for those with a high preference for the concrete learning mode; tension from being blocked is significantly lower for high concrete style individuals with middle or high affectively complex jobs than for those who deal with little affective complexity.

The pattern of affective press-concrete style interaction similarly mediates alienation from the organizational processes which facilitate career development (Table 5-27). As Table 5-26 shows, among those with high concrete style preference, alienation lessens as affective complexity increases.

We hypothesize that low affective press represents a sense of social isolation, or lack of meaningful engagement with one's colleagues. If, for example, one is only "functionally connected" to colleagues, there is an absence of an interpersonal, affective quality in one's working relationships. For those with a high concrete (intuitive-feeling) orientation, a low affective quotient in one's job negatively affects job satisfaction. Low affective complexity also increases tension from being blocked and alienation in relation to career development, in the sense that one is deprived of access to the network of working relationships through which one demonstrates competence and extends one's influence, and in other ways, furthers and broadens one's personal and career development.

In addition to the importance of one's job pressing for affective complexity--which represents opportunity for engagement with others--a corresponding, intuitive-feeling orientation is also key in the furthering of one's personal and career development. The participants in this study indicated that they recognized the importance of this orientation. During the interview, we asked respondents if they encountered work situations

TABLE 5-25

JOB SATISFACTION AS A FUNCTION OF AFFECTIVE PRESS--CONCRETE STYLE INTERACTION

A. Results of Two-Way Analyses of Variance

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main Effects					
Concrete Style	146.948	2	73.474	.880	.999
Affective Press	772.400	2	386.200	4.624	.013
2-Way Interactions					
Concrete/ Affective	941.038	4	235.259	2.817	.031
Residual	6264.295	75	83.524		
Total	8252.891	83	99.432		

B. Mean Job Satisfaction by Affective Press and Concrete Style

	Affective Press			
Concrete Style	Low	Middle	High	P**
High	47.25	64.38	65.58	.001
Low	56.57	62.86	54.60	.464
P*	.126	.711	.168	

*Based on T-Test comparisons.

**Based on One-Way Analyses of Variance.

TABLE 5-26

TENSION FROM BEING BLOCKED AS A FUNCTION OF AFFECTIVE PRESS--CONCRETE STYLE INTERACTION

A. Results of Two-Way Analysis of Variance

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main Effects					
Concrete Style	.809	2	.404	.202	.999
Affective Press	5.950	2	2.975	1.488	.231
2-Way Interactions					
Concrete/ Affective	23.631	4	5.908	2.955	.025
Residual	149.919	75	1.999		
Total	180.036	83	2.169		

B. Mean Tension from being Blocked by Affective Press and Concrete Style

	Affective Press			
Concrete Style	Low	Middle	High	P**
High	3.75	2.46	2.5	.016
Low	2.64	2.50	3.0	.487
P*	.091	.928	.184	

*Based on T-Test comparisons.

**Based on One-Way Analyses of Variance.

TABLE 5-27

ALIENATION AS A FUNCTION OF AFFECTIVE PRESS--CONCRETE STYLE INTERACTION

A. Results of Two-Way Analysis of Variance

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main Effects					
Concrete Style	54.786	2	27.393	.811	.999
Affective Press	459.553	2	229.777	6.805	.002
2-Way Interactions					
Concrete/ Affective	440.938	4	110.234	3.265	.016
Residual	2532.317	75	33.764		
Total	3527.237	83	42.497		

B. Mean Alienation by Affective Press and Concrete Style

	Affective Press			
Concrete Style	Low	Middle	High	P**
High	5.71	4.23	4.02	.001
Low	5.00	3.90	4.91	.151
P*	.127	.534	.193	

*Based on T-Test comparisons.

**Based on One-Way Analyses of Variance.

for which they were not adequately prepared in their professional education, and if they felt any pressures or needs to learn more in connection with their work. In addition to technical updates and learning more about business matters, the majority said they needed to better understand people and the communication process. There was a clear consensus among most regarding what the communication process meant, which reflects an intuitive-feeling orientation. Comments included: Recognize and respect differences among people; e.g., respect other peoples' feelings, needs, opinions, and ideas; and, don't talk down to non-engineers (technicians, draftsmen, etc.).

We also asked respondents how they were influenced by their colleagues. Most of the respondents said they worked with colleagues 10-15% of their time. They shared ideas about projects, technical approaches, problems, and solutions. For some, colleagues helped one to see other views; some colleagues also provided moral support and feedback for growth. These comments reflect a press-style congruence or match that combines a high degree of affective complexity and a correspondingly strong orientation toward the concrete (intuitive-feeling) learning mode. The responses of other individuals, however, suggest that not all are oriented to this learning mode. Some indicated that they felt little affect from their colleagues; a few were negative and said they had nothing to learn from others. One answered, with a sound of smugness in his voice, "I ignore their existence." Others sounded competitive; for example, one said, "I try to do better than they do, to avoid their pitfalls--without backstabbing."

Those individuals with little capacity for engaging in concrete experiences, who may be the highly autonomous technical specialists, prefer to work in jobs with moderate affective press jobs. High affective press is apt to be perceived by them as a demand which may threaten their sense of professional independence. Thus, while these individuals may have influence in technical matters--to the degree their interpersonal style allows them to be influential---essentially, they work in social isolation. This tends to keep them removed from the mainstream of organizational activities; and, the effect of this is to reduce their personal and career development opportunities to a narrow, highly specialized, path of technical competence.

Summary of Press-Style Interactions. In general, we see job press (symbolic, behavioral, and affective complexity) as representing access to organizational activities, as well as access to opportunities for further personal development, rather than as a burden, in the sense of role overload. In essence, the "press" can be truly seen as a learning or growth environment. Higher degrees of job complexity are particularly important among individuals with a strong preference for the corresponding learning style. These individuals tend to be most negatively affected by the low person-press mismatch situations. While low symbolic press represents a level of "Kelly Girl engineering" which seems to be resented, low affective and behavioral press are associated with interpersonal isolation and a sense of being out of the action, or out of the mainstream of organizational activity.

In our analysis we found no evidence which suggests there are negative consequences associated with "too high" a press for symbolic or behavioral complexity. We hypothesize that affective press may function somewhat differently, and that it is possible for some technically-trained professionals--particularly those who highly value autonomy--to be pressed by a demand for social sensitivity and involvement with colleagues which exceeds their capability.

Differences in Learning Style and Job Press by Organizational Role. In the preceding sections we looked at press-style congruence in terms of the effects of match or mismatch on job satisfaction, tension from being blocked, and experienced alienation. Now we will compare differences in style and press across four organizational roles: senior manager, manager, senior engineer, and engineer. (See Section III-D for the job titles which correspond to each organizational level of manager and engineer.) Tables 5-28 and 5-29 portray the differences in learning style and job press across the four groups.

As Table 5-28 shows, there are not significant differences in degree of preference for the abstract, active or concrete modes across the four job levels. This means, then, that the converger, accommodator, and assimilator learning styles are fairly equally distributed across the four groups of managers and engineers. This table also indicates that our sample is similar to the larger Alumni Sample reported on throughout Section IV in that there is a predominate "rational, scientific" preference for the abstract mode over the concrete mode. While we assume the manager and engineer roles have some shaping influence on the individual over time, in terms of pressing for a more concrete or abstract adaptive mode, statistical evidence for this is not available. Our sample appears more influenced in general by their professional specialization, than by job role. In subsequent discussions we will treat role and job level as independent of learning style.

Table 5-29 shows that the two manager groups report more affective and behavioral job press than do the two engineer groups. We may thus infer that the affective and behavioral job presses, which we associate theoretically with the manager role, are indeed a function of that role. We would expect to find that the degree of symbolic complexity is not significantly different across these groups because they are all technically trained people who work in an industrial environment, and because the total symbolic job press, as reported, is not extremely demanding. When the three job presses are combined for a measure of the total job press reported by each group, we find that the second engineer group reports less total job press than any other group, and significantly less than either manager

TABLE 5-28

MEAN LEARNING STYLE BY ORGANIZATIONAL ROLE

(n)	Senior Managers (12)	Managers (15)	Senior Engineers (29)	Engineers (28)	P*
Abstract Style	18.00	18.00	18.03	19.32	.455
Active Style	17.17	16.67	17.03	17.07	.704
Concrete Style	13.67	14.33	13.55	13.07	.640

*Based on One-Way Analyses of Variance.

TABLE 5-29

MEAN JOB PRESS BY ORGANIZATIONAL ROLE

(n)	Senior Managers (12)	Managers (15)	Senior Engineers (29)	Engineers (28)	P*
Symbolic Press	4.35	4.40	4.88	4.33	.065
Behavioral Press	5.46	5.31	4.32	4.33	.001
Affective Press	5.51	5.53	4.39	4.26	.001
Total Job Press	5.0	5.0	4.6	4.3	.001

*Based on One-Way Analyses of Variance.

group. The impression this suggests is that they are "underwhelmed" in their jobs.

Table 5-30 shows the distribution of the four groups across each job press. The following summarizes this table in terms of relative job press for the four groups. Senior managers are clearly in jobs which press for high behavioral and affective complexity, and a middle degree of symbolic complexity. The second manager group also report a high press for affective and behavioral complexity. This group splits between reported low and high degree of symbolic complexity.

Senior engineers reports more symbolic complexity in their jobs than the other groups, as shown in Table 5-29, although the differences are not significant. This may be accounted for by Table 5-30, which shows that less than one-half of the senior engineer group report a high degree of symbolic complexity. Over half of the senior engineers report a low press for affective complexity, and nearly half report low press for behavioral complexity. The second engineering group divides across high--middle--low degree of symbolic complexity, with the largest subset reporting a low press. While nearly half report low affective press, and half report low behavioral press, the remainder divide fairly evenly between middle and high degrees of affective and behavioral press. This analysis provides us with a partial explanation of why engineers tend to be underwhelmed (least overall press scores in Table 5-29) rather than overwhelmed by task and role complexity; the majority have jobs characterized by a middle to low range of symbolic, behavioral, and affective complexity.

Table 5-31 compares the mean job satisfaction, tension from being blocked and alienation scores across the four groups. Here we see that the second engineer group (the underwhelmed) reports the least job satisfaction and the most tension from being blocked and alienation from one's own career development. This group is also the youngest, as we would expect, with a mean age of 34, compared to 45 for senior engineers; we hypothesize that the career development of these younger engineers is particularly threatened by the relatively low job press; not only does low job press represent a lack of access to organizational activities, it also deprives one of opportunities to demonstrate or further develop symbolic, behavioral, or affective competence.

Summary. We have characterized the dominant engineering mentality as having a rational, analytical, thinking-sensing problem solving orientation. The descriptions gathered through our interviews were confirmed through measures of learning style and personality type. Although we found interesting individual differences, e.g., a few "divergers" and a number of intuitive problem solvers, there are no significant differences in style across the manager and engineer group.

TABLE 5-30

DISTRIBUTION OF HIGH--MIDDLE--LOW JOB PRESSES
BY ORGANIZATIONAL ROLE

Symbolic Press

	N	Low %	Middle %	High %
Senior Managers	12	25	67	8
Managers	15	47	13	40
Senior Engineers	29	17	38	45
Engineers	28	39	32	29

Behavioral Press

	N	Low %	Middle %	High %
Senior Managers	12	0	25	75
Managers	15	7	33	60
Senior Engineers	29	45	41	14
Engineers	28	50	29	21

Affective Press

	N	Low %	Middle %	High %
Senior Managers	12	0	33	67
Managers	15	0	27	73
Senior Engineers	29	52	31	17
Engineers	28	46	29	25

TABLE 5-31

MEAN JOB SATISFACTION, TENSION FROM BEING BLOCKED, AND ALIENATION BY ORGANIZATIONAL ROLE

	Senior Managers	Managers	Senior Engineers	Engineers	P*
Job Satisfaction	67.58	60.73	60.03	56.30	.012
Tension from being Blocked	2.21	2.80	2.52	3.06	.003
Alienation	4.04	4.35	4.54	4.86	.053

*Based on One-Way Analyses of Variance.

There are, however, significant differences in the degree of affective and behavioral job press across the four groups, with both manager groups reporting significantly more of both than the engineer groups. We would expect this in that we associate the affective and behavioral presses with the manager role. What is troubling is the extent to which these presses affect not only job satisfaction, but they also mediate tension from being blocked and alienation. This means that one consequence of low affective and behavioral press, regardless of the person's match or mis-match with the press, is a perceived lack of involvement with well thought-out, participative activities associated with selection, performance standards, and promotion. We thus infer that low affective and behavioral complexity, in the context of organizational activity, also negatively affect the individual's capacity to develop a self-mediated career pattern.

What stands out for us in this analysis of the effects of the affective and behavioral complexity is that even if one appears to be stretched by a high demand for affective and behavioral complexity, rather than feeling overwhelmed, one seems to feel more involved in one's own career development. Thus mis-match on the high-side (i.e., press greater than personal competence) may cause healthy stretching while mis-match on the low-side (competency greater than press) may lead to low satisfaction, alienation, etc. When we look at the effects of symbolic press, we find it ironic--in this study of technical careers--that while symbolic press is significantly related to job satisfaction, it does not significantly mediate experienced tension from being blocked or alienation. We infer that the symbolic press of one's job is not perceived as connected to the mainstream of the organization or the reward structure. It thus has little effect on career development outside of the path of technical specialization. Again, we are faced with the dilemma in engineering that being specialized in those competencies to do technical work - the identity of the profession - has little impact upon many of the career paths taken by engineers. The taking of those other paths (i.e., management) requires high competencies in other, non-technical areas for which most engineers are ill-trained.

As we step back further from the engineering context, per se, other important findings emerge. The affective-symbolic-behavioral schema for conceptualizing the components of one's work environment continue to appear valid. They, in conjunction with experiential learning theory have given some insight into just what a person-environment match or mis-match is. This study suggests, for instance, that the general implication from Lewin's $B = f(P,E)$ paradigm, that a P-E match is ideal, is overly simplistic. In our study, a match between high personal orientation and high job press orientation was ideal with regard to job satisfaction, alienation, blockedness, and access to growth opportunities. A "match" between low personal orientation and low press did not suggest an ideal picture. In a similar view, the concept of mis-match was also shown to be rather complex. One might better distinguish between overqualified (person $>$ press) and underqualified (press person). The latter could lead to stretching and career growth while the former characterized our "underwhelmed" disassociated second engineering group.

These emerging thoughts about P-E match and mis-match effects are considered in more detail in the next study (Section V-G).

G. Assessing Person-Job Match and Mis-Match: Professional Competence as a Function of P-E Interaction in Engineering and Social Work

Ronald Sims*

Introduction. This study utilizes a person-job congruence model (Fry and Sims, Section V-E) that measures the person and job in commensurate terms to understand the effects of match versus mis-match in person-environment interactions in two professions: engineering and social work. The person-job model presented allows for the identification of pivotal (versus peripheral) competencies for effective performance of key jobs in both professions. Results from studies of social work and engineering professionals are presented to test the validity and utility of the model, and to enhance our understanding of the Lewinian phenomenon of person-environment fit.

Research on Person-Job Relationships. Recent research on micro-person environment models (Seybolt, 1980) focus on the individual, the job, and the job context. Most notable among these has been the job design-redesign research of Herzberg (1966), Turner and Lawrence (1965), Hulin and Blood (1968), Hackman and Lawler (1971), Hackman and Oldham (1976) and Sims, et al. (1976). The general consensus of this research is that individuals will respond differently depending on the degree of fit or misfit between the individual attributes and job characteristics Seybolt (1980); Nemiroff and Ford (1976); O'Reilly (1977), and Abedel-Halim (1980) show significant differences in individual attitudes, job performance and stress depending on the degree of fit or misfit between the individual and job or organizational characteristics. Hackman and Lawler (1971) as well as Lawrence and Lorsch (1967) and Morse and Lorsch (1970) have pointed out the significance of the person-job relationship in understanding organizations. More recently Suttle (1977), Schein (1978), and Hackman and Oldham (1980) studied the person-job relationship in determining quality of work life, in career dynamics and in work redesign. Findings from these studies illustrate the importance of the "match or fit" between the person's skills and the demand or characteristics of his/her job, and indicate that the person-job match or mismatch must be given careful consideration in understanding organizational effectiveness.

A major weakness of this research, however, is that the conceptual frameworks used do not describe the person and the job in commensurate terms. A lack of commensurate measures for the person and the job makes comparison between the two difficult (Murray, 1938; Fry, 1978). An additional weakness is that the conceptual framework's failure to indicate which specific facets of jobs are expected to fit with what particular characteristics of individuals (Dubin, 1976). Although in certain situations a close person-job fit may not be critically important for effective performance or job satisfaction, in others the zone of tolerance is very narrow and requires an exact fit (Faunce and Dubin, 1975). Developing commensurate measures of the person and job, and identifying pivotal versus peripheral skill areas, are the tasks of the present research.

Person-Job Congruence Model. This model, developed earlier in Section V-E, contends that organizations should begin to view the person as learner and the job as learning environment. The basis for this view is that learning, adaptation, and problem solving processes are similar and that all jobs have learning, adaptation and problem solving in common. Therefore if we can describe the adaptive skills which both the person possesses and the job requires, we can measure the potential for learning, and hence, effective job performance. When areas of congruence and mis-match are discovered, we can recommend changes in job design or learning agendas that can foster improved performance.

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Underlying this model are several assumptions; first, that people change and adapt; second, that they are capable of learning different types of skills and have many differences that they bring with them into an organization; and third, that jobs are many things to many people and most job requirements attach differing amounts of importance to different skills. Furthermore, that not all skills are equally important for effective performance of a job; effectiveness in our model is contingent upon a dynamic match over time between the person and job in pivotal as opposed to peripheral skill areas which respond to increased job demands. Pivotal skills are those which a person must possess or learn to effectively perform a job, while peripheral skills refer to other skills which the individual may possess but are not directly relevant to effective job performance.

Hypothetically, once the requirements of the job are clear and the characteristics of employees are assessed, jobs and people can be matched. To match the job and the person, a framework for assessing performance competency in the job and personal competency should exist. Experiential Learning Theory as developed by Kolb (1981) provides a framework for describing adaptive competencies in such a way that personal skills and job demands can be thought of in the same terms. Since adaptation and learning are characteristics of all person/job transactions, a taxonomy of competencies derived from ELT makes comparison possible across widely different settings, occupations, and tasks. In this taxonomy four modes of learning are conceived of as generic competencies that encompass many specific performance competencies.* The idea of matching people and jobs, however, is dependent upon the existence of an organizational climate which encourages and enhances the matching process.

If an organization decides to fill its positions by matching the characteristics of a person and the requirements of a job, organizational effectiveness should increase as a result of greater personal satisfaction and improved job performance. In this model, growth climate is the variable which allows the person to develop his relationship with his job to an optimal level of performance and satisfaction. Thus, matching the person and the job is seen as dependent upon the growth climate.

This model also stresses the importance of three person-job match and mismatch combinations: (1) person's skills exceed the demands of the job (overqualified); (2) person's skills are congruent with the demands of the job (matched); (3) demands of the job exceed the person's skills (underqualified). It is hypothesized that the consequences of the person-job match/mis-match will differ, e.g., underqualified and overqualified individuals will have lower job performance and satisfaction than individuals who are matched. This relationship may be tempered by career stages within the organization or by one's position in the organization. The responsibilities and opportunities associated with a position, and the network of relationships with superiors and coworkers which are determined by the position, largely determine one's access to organizational resources. Hence, each person experiences the organization from a particular vantage point, determined by his role in the organization, and people in similar roles are apt to perceive the organization in the same way.

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*For detailed description of these competencies, refer to Section IV-C: "The Competency Circle."

We have conceived of the learning styles described in Experiential Learning Theory as learning competencies, that is, as higher level learning heuristics that facilitate the development of a generic class of more specific skills that are required for effective performance on different tasks. Each task requires its own knowledge, skills, and attitudes for effective performance. The effective matching of task demands and personal attributes results in what will be called a performance competency. Performance competencies thus become a vehicle for assessing personal characteristics and job demands in commensurate terms. Performance competencies required for a specific job can be compared to a person's inventory of performance competencies in order to determine the degree of fit, areas for needed development, or job redesign.

Person-Job Match: Theoretical Views. Within the past decade, person-job research has investigated the person-job match relationship in terms of the overall match of the person and job (French, et al., 1974; Harrison, 1976; and Kulka, 1976). Job design researchers in particular have developed models that explicitly address the importance of the "fit" between the person and the job (Hackman and Oldham, 1976; Hackman, 1976). In a similar vein, the trend in research on personnel selection and placement is to measure attributes of both the job and job candidates so to identify potentially effective combinations of job demands and individual skills and abilities (Dunnette, 1966, 1976). These theories do not demonstrate the importance of a more sophisticated taxonomy of persons' skills and the demands of the job. The use of the pivotal versus peripheral concepts referred to in the person-job model presented above attempt to increase our ability to observe and understand matched and mis-matched situations. The research cited in this paper contributes to the extension of knowledge on the person-job relationship. Accordingly, this study presents the results of an investigation into the validity and utility of the person-job congruence model presented in this paper.

Methodology. An objective of this research was to reach findings and conclusions which are not limited to one individual, job or organization but rather would yield implications for individuals and jobs in various organizations. For the realization of such an objective, it was necessary to locate different groups of individuals who occupy different jobs in a variety of organizations.

The selection of professional social workers and engineers as comparative groups in this study was derived from the need to have clear differences with respect to personal characteristics or learning styles and job characteristics.

Previous research (Kolb, 1976; Manring, 1979; Gypen and Sims, 1980) has shown that engineers tend to score in the converger quadrant (using Kolb's Learning Style Inventory), while social workers tend to fall in the accommodative quadrant. It has also been shown that the professional education of both these professions reinforce the development of distinctive learning styles and this reinforcement is carried over into jobs within organizations (Manring, 1979; Gypen and Sims, 1980; Miller, 1979).

The decision to study graduates from Case Western Reserve University rather than a number of schools was based on four considerations. First, both the Case Institute of Technology and the School of Applied Social Science are outstanding institutions in their respective fields. Second, there was a perceived need to control the variables associated with a learning environment as closely as possible. This is obviously more easily facilitated by reducing the source of variance, in this case the number of institutional settings in which subjects received their professional training. Third, data including course selection and demographic data was readily accessible. In addition, contacting graduates was simplified because of the existence of a well defined and active alumni program.

To reach all engineering and social work alumni would have been impractical and overly costly because they are so numerous and spread all over the country and even abroad. It was, therefore, necessary to address a limited yet representative "sample" of the population.

The sample for the present study was taken from an original sample stratification of the Alumni Study described in Section III-A. From the original population, an n of 270 was drawn for the engineers and 111 for social workers. In order to classify the sample into homogeneous occupational categories or career stages, engineers were categorized into three groups: (a) bench engineers (n = 73), entry-level engineers responsible for completing technical tasks in their jobs; (b) technical managers (n = 79), engineers responsible for the supervision of bench-engineers; (c) general managers (n = 48), engineers in vice president or president positions in organizations. Social workers were categorized into two groups: (d) direct service (n = 38), social workers in entry-level positions having direct contact with clients; and (e) administrative social workers (n = 48), social workers responsible for supervisory or administrative responsibilities in social service organizations. Some subjects from the original sample were not used in parts of the analysis because the respondents' answers to "current job title" questions did not fit these career stages or job role categories.

Measurement of Variables. A major objective in this research was to develop a taxonomy of those performance competencies that meet two criteria: ecological validity and construct validity. By ecological validity we mean that the taxonomy of competencies developed should faithfully and substantially describe the important aspects of all the jobs we examine in social work and engineering. Observers or incumbents in these jobs should be able to fully describe their jobs by using competencies in the taxonomy. Construct validity is used in a specific sense here to describe their jobs by using competencies in the taxonomy. Construct validity is used in a specific sense here to describe how well the performance competencies relate empirically to the learning competencies described in Experiential Learning Theory. If both of these criteria can be met, the taxonomy of performance competence becomes an holistic system for assessing persons and jobs. Such a system has several desirable characteristics:

1. It becomes possible to describe very different jobs in similar terms. Among other things, this might enable giving equal pay for equal work as well as the identification of transferable skills across job categories.

2. Developmental and educational needs can be identified along career paths through the identification of those job transitions that require markedly different portfolios of performance competencies.

3. Preparatory and professional education can be addressed to the development of pivotal learning competencies required for performance in different professional careers. The focus of professional education would then become "learning how to learn" required performance competencies rather than acquiring specific skills that may become obsolete before they are used.

4. Areas of deficiency resulting from specialized education and work experience can be identified and addressed in order to prepare individuals for the integrative challenges of higher level jobs and adult development tasks.

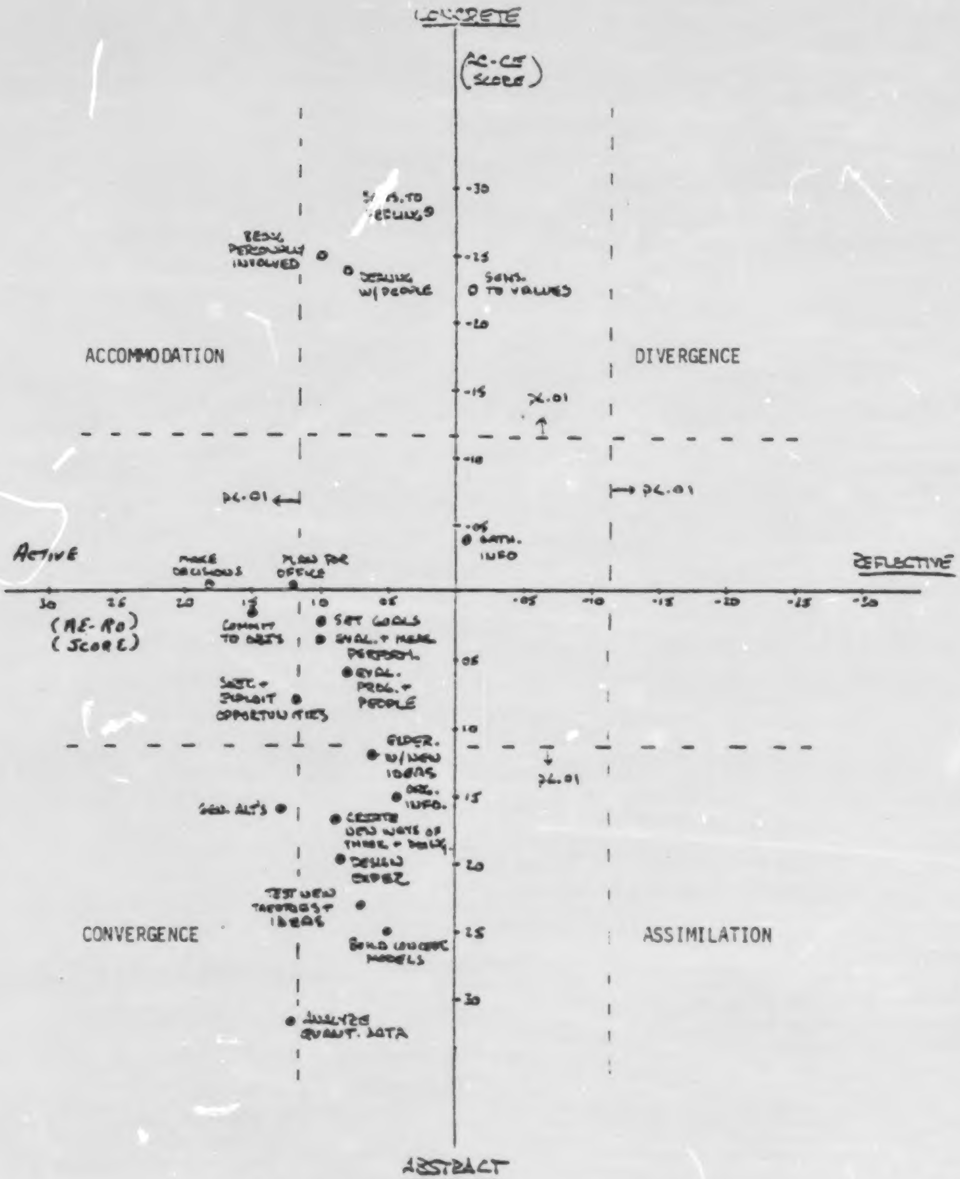
1. Personal characteristics and job characteristics. The research reported here must be seen as a first step toward meeting the criteria of ecological and construct validity. We have achieved some modest success in reaching these goals but have also identified important problems for future research. To study the relationship between learning styles as learning competencies and the specific performance competencies associated with them, we developed a list of performance competencies based on our knowledge of the jobs in social work and engineering and the hypothesized relationship of these performance competencies to learning styles. The resulting list of 24 competencies was submitted to the engineering and social work survey sample as part of a questionnaire (see Appendix A). Respondents were asked to rate their level of skill on these competencies (called work abilities on the questionnaire to avoid jargon) on a seven-point scale (0 = unskilled to 7 = highly skilled).

To assess construct validity in the relationship between the performance competencies and the learning competencies of Experiential Learning Theory, the self rated competencies of professional engineers and social workers were correlated with LSI abstract/concrete (AC-CE) and active/reflective (AE-RO). These correlations were then plotted on the two dimensional learning space created by combining these two scores (see Figure 5-16). For example, the skill of being personally involved correlated -.25 with AC-CE and +.10 with AE-RO, placing it

FIGURE 5-16

Correlations Among Work Abilities
and Learning Styles

(SASS and ENGR.
Alumni N=420)



in the accommodative quadrant of the learning style space. The results of this analysis showed four competencies significantly related ($p < .01$) to the learning competence of affective complexity (Concrete Experience)--being personally involved, dealing with people, being sensitive to people's feelings, and being sensitive to values. Three were related to behavioral complexity--making decisions, committing one's self to objectives, and seeking and exploiting opportunities. Seven performance competencies were related to symbolic complexity--experimenting with new ideas, creating new ways of thinking and doing, generating alternative ways of thinking and doing, analyzing quantitative data, designing experiments, testing theories and ideas, and building conceptual models. In this statistical analysis, no competencies were related to perceptual complexity (Reflective Observation). Some performance competencies predicted to relate to the perceptual complexity learning competence such as "gathering information" did not correlate significantly with any of the four learning competencies, while others such as "creating new ways of thinking and doing" related significantly to symbolic complexity, instead.

To further refine these generic clusters of performance competencies, the 24 competencies were subjected to factor analysis and cluster analysis. Factors and clusters in this analysis corresponded directly to the three learning competency clusters identified by correlation with the LSI. A fourth factor and cluster encompassed the items of gathering and organizing information which we have chosen to treat as the perceptual complexity cluster of performance competencies. "Setting goals" was also added to the behavioral complexity clusters as a result of this analysis because of its high loading the factors and cluster indicating the other three behavioral performance competencies.

The result of these analyses was our best estimate of the performance competencies associated with the four learning competencies of experiential learning given the limitations of the data. These clusters of performance competencies were arranged around the generic learning competencies of the learning cycle in what we called a competency circle (see Section IV-C for details of derivation). This competency circle was used as a tool for further data analysis for describing personal characteristics, job characteristics, and person-job congruence. Examples of competency circles describing the overall job demands of the five professional roles under study are shown in Figures 5-17, 5-18, 5-19, 5-20 and 5-21.

2. Salary. This refers to the present salary of the individual. For engineers, the salary is broken into two categories: those above \$30,000 a year and those below \$30,000 a year. For social workers, the salary is divided into two categories also: over \$20,000 and under \$20,000 a year.

3. Growth climate. Growth climate refers to the perceived or experienced climate of the organization by the individual. Growth climate is measured by a combination score of the individual's perception of his relationship with supervision, his autonomy, the chance to grow and develop, and advancement potential within the organization. Growth climate responses are on a seven-point scale.

4. Job satisfaction. Job satisfaction refers to the individual's affective appraisal of job dimensions: the nature of the task and the value of the service the individual's organization performs. These two items, each on a seven-point scale, measure job satisfaction.

FIGURE 5-17

Job Demands for Direct Service
Social Workers

Work Abilities Index

Affectively Related:

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

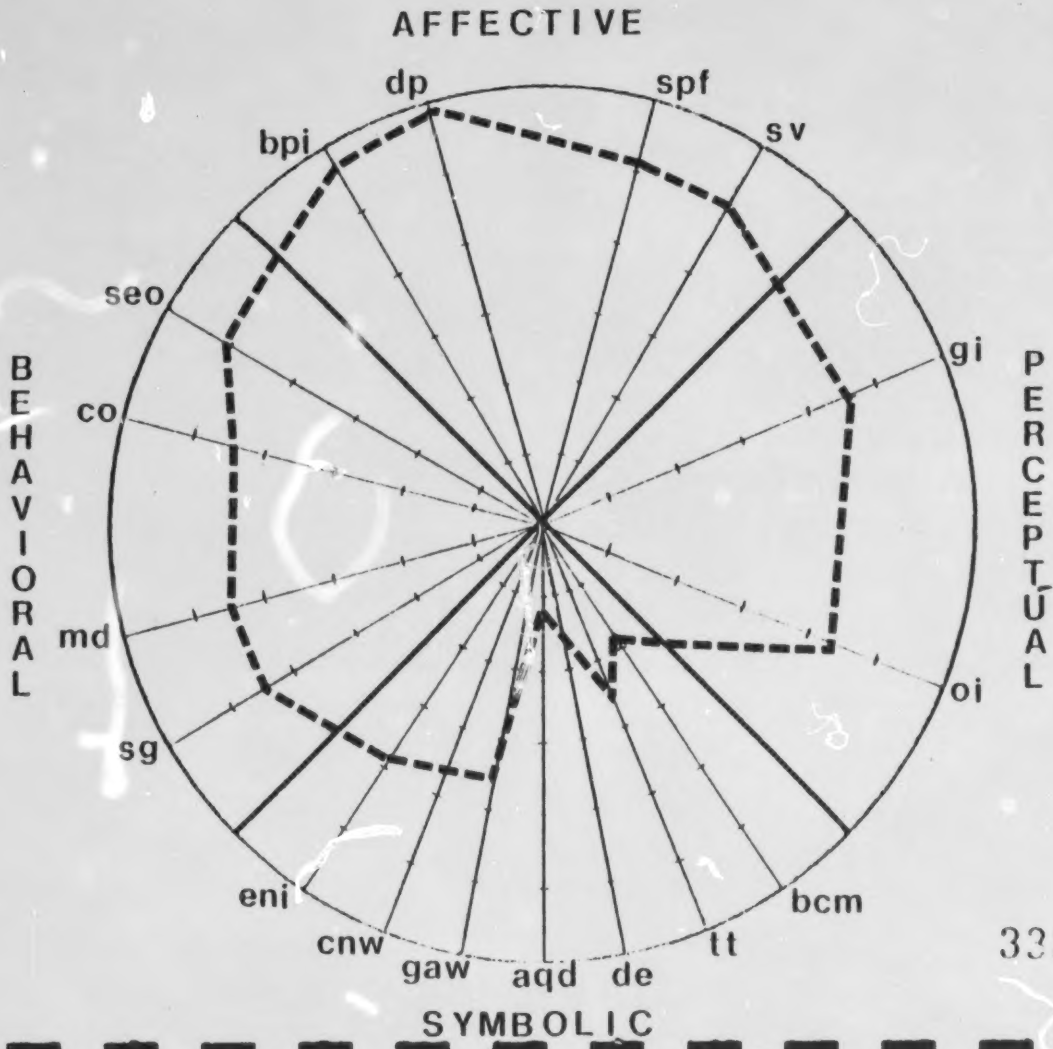
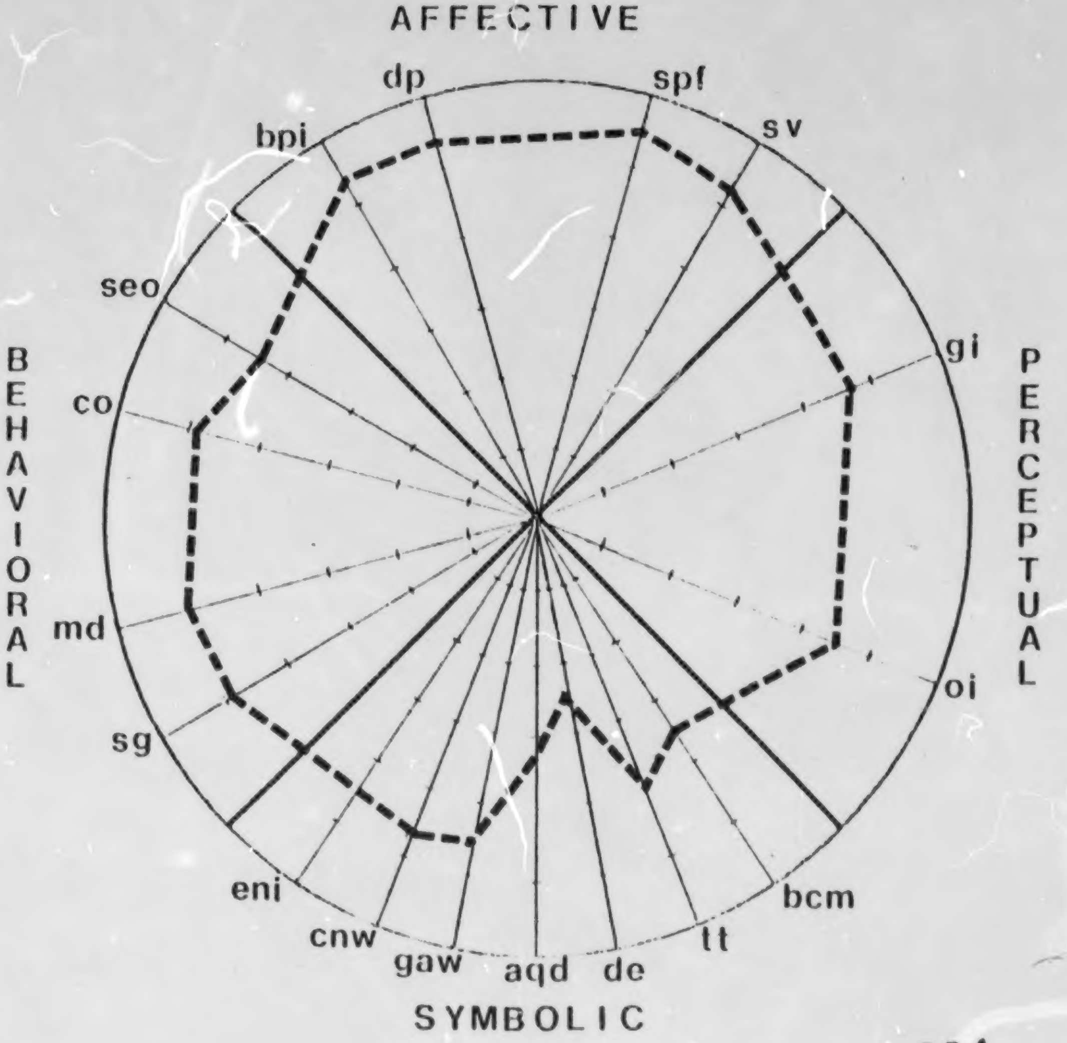


FIGURE 5-18

Job Demands for Administrative Social Workers



Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

FIGURE 5-19

Job Demands for Bench Engineers

Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

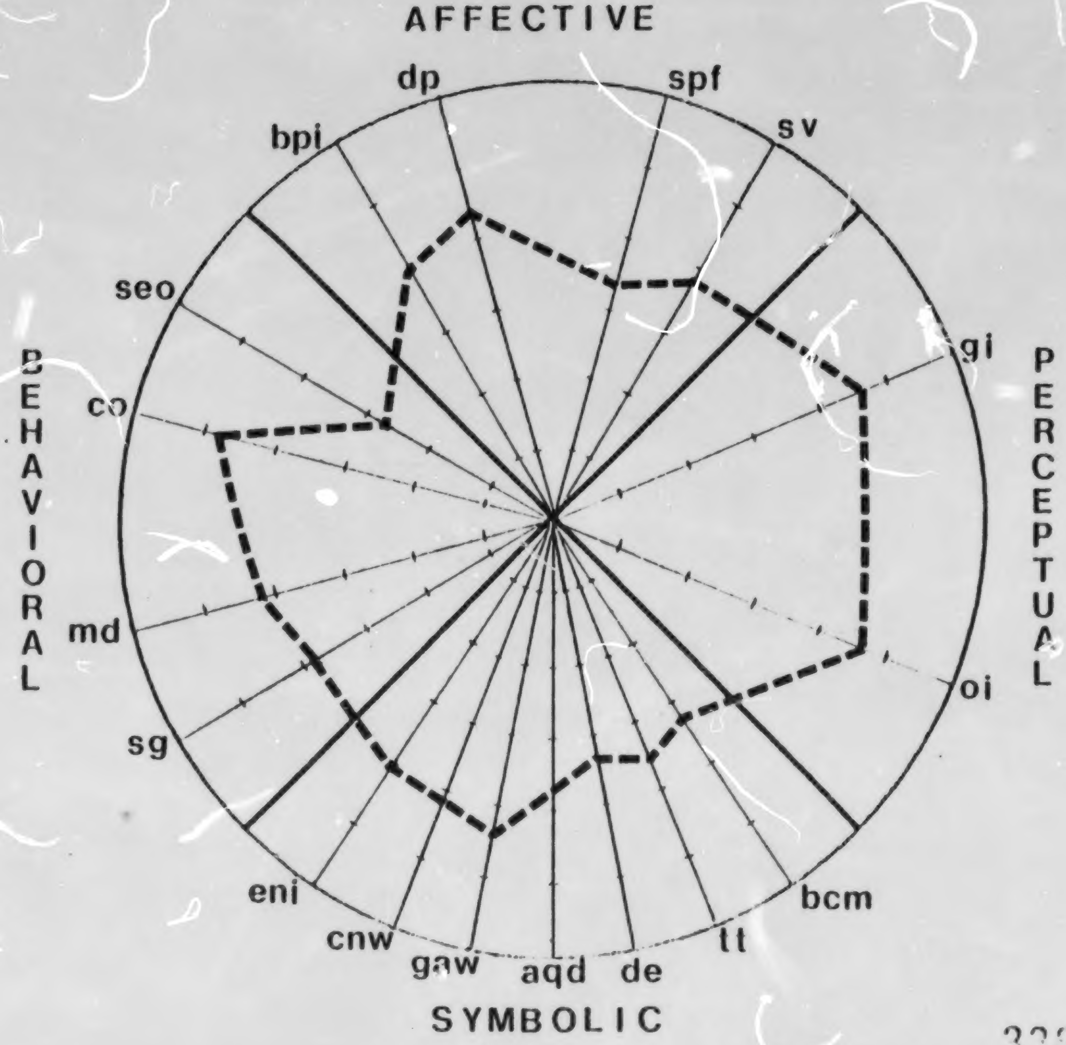
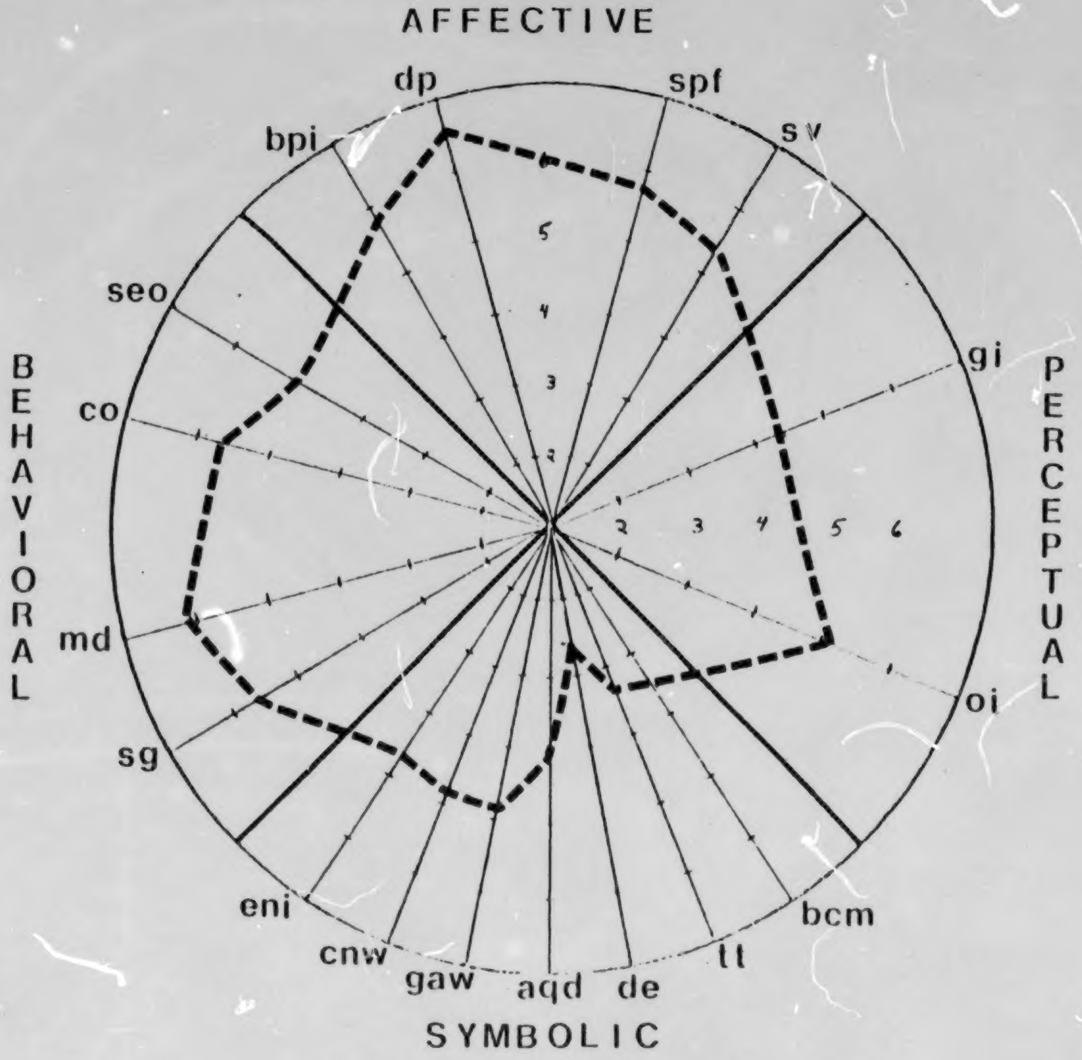


FIGURE 5-20

Job Demands for
General Managers



Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

FIGURE 5-21

Job Demands for Technical Managers

Work Abilities Index

Affectively Related:

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

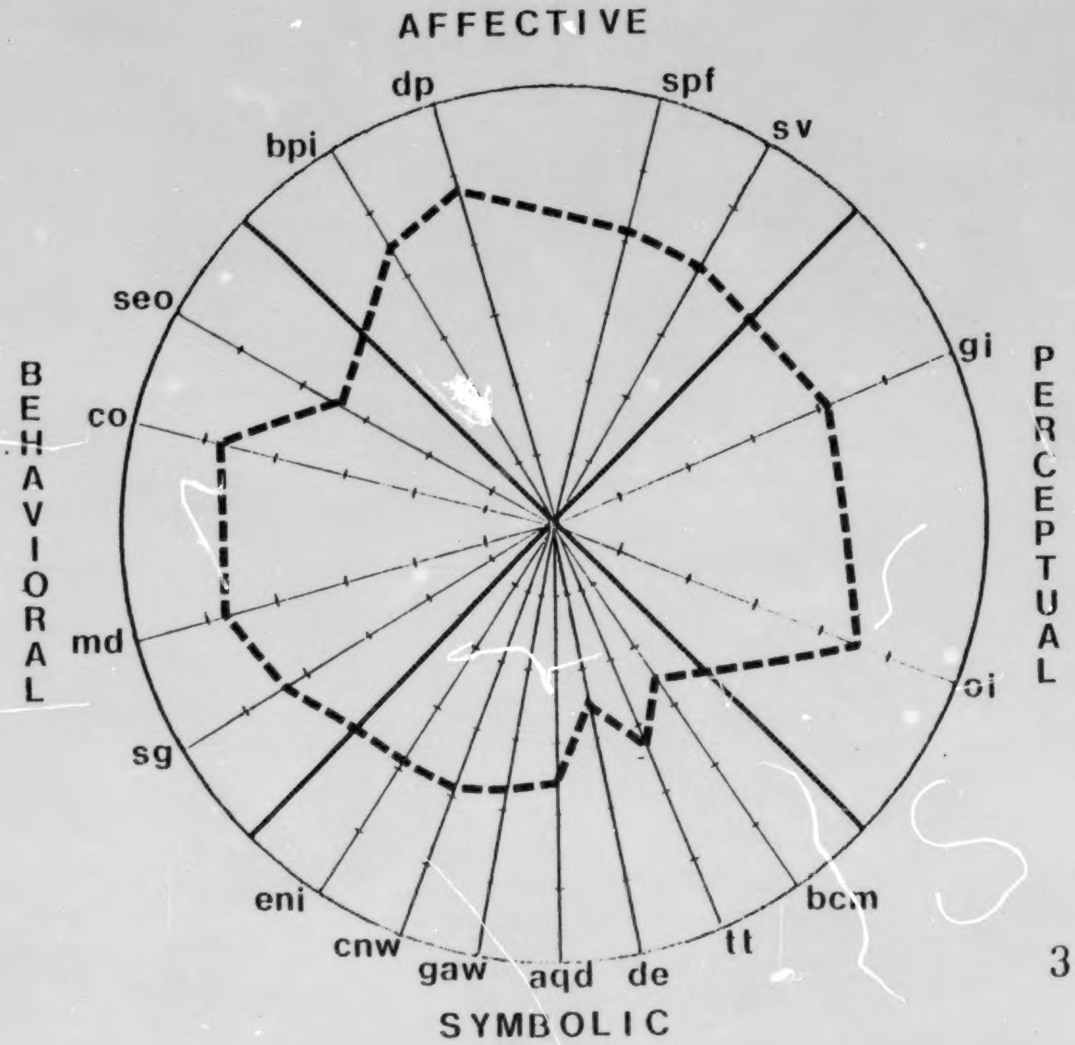
gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals



5. Job performance. Job performance refers to the individual's appraisal of their performance in their job. Four items, each on a seven-point scale measure job performance.

Predictions. Based on the theory described earlier, the following predictions can be made concerning the relationship between person and job match in pivotal skill areas:

Hypothesis 1: Individuals who are matched between personal skills and job demands in pivotal skill areas will report higher job satisfaction, job performance and salary than individuals mismatched in pivotal skill areas.

Hypothesis 2: Individuals who rate their organizations as high in growth climate will more likely see their personal skills as being matched with their job demands in pivotal skill areas.

Results

(1) Identifying Pivotal versus Peripheral Skills. Before presenting results for each hypothesis it is necessary to identify the pivotal and peripheral skills for each job role for the Engineering and Social Work samples.

For each job category, normalized mean scores were determined for each of four performance competency areas (Affective, Perceptual, Symbolic, Behavioral). For example, an Affective Press score was the mean of the sum of the respondents' answers to the perceived importance of five select items on the Job Characteristics Inventory. (These five items were the ones that resulted from the cluster/factor analysis described earlier.) For each job type, the pivotal skill area was the mean score, of the four, that was significantly different from the others: It was the skill or competence area that was required most for effective performance on the job.* T-tests were done between the mean scores for the four performance competency areas to examine for significant differences. In those instances where there were two or more mean scores which were not significantly different from each other but were significantly different from those means which were lower, there is more than one pivotal skill area defined. In other words, a particular job will require more than one performance competency area for effective performance.

The data presented in Table 5-32 indicates that both direct service and administrative social workers identify the affective competency area as the pivotal

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*We also attempted to identify pivotal versus peripheral skills by taking the mean scores for each of the 17 perceived job demands and taking those mean scores that were above 6.00 for Social workers and 5.00 for Engineers as pivotal skills and those that were below those means as peripheral. However, our analysis showed no differences between the pivotal and peripheral skills. This tends to support the validity of using Affective, Perceptual, Symbolic, and Behavioral groupings if they do, in fact, show differences.

TABLE 5-32

Job Demand Mean Scores
for Social Workers

	Affective		Perceptual		Symbolic		Behavioral							
	M	SD	M	SD	M	SD	M	SD	t_{A-P}	t_{A-S}	t_{A-B}	t_{P-S}	t_{P-B}	t_{S-B}
Direct Service Competency Areas	6.6	.55	5.6	1.3	3.4	1.2	5.0	1.0	4.33^{****}	14.42^{****}	10.00^{****}	7.09^{****}	2.28^{**}	9.53^{****}
Administrators	6.3	.90	5.6	1.2	4.3	1.1	5.7	0.8	3.01^{**}	11.18^{****}	3.92^{****}	7.42^{****}	NS	12.34^{****}

* $p \leq .10$
** $p \leq .05$
*** $p \leq .01$
**** $p \leq .001$
═ Pivotal Skill Area

Direct Service: N = 38

Administrators: N = 48

skill area in their jobs. Table 5-33 shows that bench engineers identified the perceptual competency area as the pivotal skill area for their jobs. Technical managers identified the affective, perceptual, and behavioral competency areas as pivotal, while general managers identified affective and behavioral competency areas as pivotal for their jobs.

2. Job Satisfaction, Job Performance and Salary Results. Tables 5-34 and 5-35 report the results of analyses conducted to evaluate the prediction that job satisfaction, job performance and salary will be higher for individuals matched between their personal skills and job demands in pivotal skill areas than individuals mismatched in pivotal skill areas (Hypothesis 1 above).

Both tables show that Hypothesis 1 is supported for direct service social workers, bench engineers, technical managers, and general managers on the variable of job satisfaction, while there is mixed support for administrative social workers. On job performance, Hypothesis 1 is supported for all job roles with mixed support for technical managers in the behavioral competency area and no support for general managers in the affective competency area. On the salary variable support for Hypothesis 1 is only found for technical managers in the affective, perceptual and behavioral competency areas.

Overall, on the three dependent variables for job satisfaction, job performance and salary evidence supports the notion that matched individuals on personal skills and the demands of the job report higher job satisfaction and job performance than mismatched individuals in pivotal skill areas and mixed support on salary. However, not all of the results are statistically significant.

3. Growth Climate Results. Table 5-36 reports the results of analyses conducted to evaluate the prediction that individuals who rate their organizations as high in growth climate are matched in pivotal skill areas (Hypothesis 2 above). One way analysis of variance was again used for each job role (career stage) presented above to test the second hypothesis.

The results for Hypothesis 2 are supported for each job role. Individuals matched between their personal skills and the demands of the job in pivotal skill areas rate their organizations higher in growth climate than individuals not matched (underqualified and overqualified) in pivotal skill areas.

Discussion

The results presented above provide support for the hypotheses. As predicted, individuals who were matched between their personal skills and the demands of the job in pivotal skill areas reported higher job satisfaction, higher job performance, and rated the organizations growth climate higher than did individuals not matched in pivotal skill areas. Previous studies have investigated the person-job match in terms of overall match of the person and job (French, et al., 1974; Harrison, 1976; and Kulka, 1976). The results of this study extend the person-job match theory by demonstrating the usefulness of exploring the person-job match in pivotal skill areas.

TABLE 5-33

Job Demand Mean Scores for Engineers

Competency Areas													
Affective		Perceptual		Symbolic		Behavioral							
M	SD	M	SD	M	SD	M	SD	t_{A-P}	t_{A-S}	t_{A-B}	t_{P-S}	t_{P-B}	t_{S-B}
		Bench Engineers											
4.8	1.1	5.5	1.3	4.7	1.2	5.0	1.1	4.33^{****}	NS	NS	6.21^{****}	5.03^{****}	1.85^{*}
		Technical Managers											
5.3	1.1	5.0	1.3	4.4	1.1	5.4	1.1	NS	4.57^{*}	NS	3.06^{****}	NS	6.18^{*}
		General Managers											
5.8	1.0	4.8	1.4	4.1	1.2	5.6	1.1	4.67^{****}	9.62^{****}	NS	3.14^{**}	3.79^{****}	8.76^{****}

* $p \leq .10$
** $p \leq .05$
*** $p \leq .01$
**** $p \leq .001$

══ Pivotal Skill Area

Bench Engineers: N = 73
Technical Engineers: N = 79
General Managers: N = 48

Table 5.34
Job Satisfaction, Job Performance and Salary Means for Engineers

	Bench Engineers(N=73) (PERCEPTUAL)			Technical Managers(N=78) (AFFECTIVE)			Technical Managers(N=78) (PERCEPTUAL)		
	UQ*	M*	OQ*	UQ*	M*	OQ*	UQ*	M*	OQ*
Job Satisfaction	5.5	5.9	5.5	5.5	5.7	5.1	5.6	6.0	5.4
Job Performance	5.1	5.2	5.1	5.7	6.0	5.8	5.8	6.2	5.8
Salary****	1.1	1.3	1.7	1.3	1.5	1.3	1.3	1.5	1.3

	Technical Managers(N=78) (BEHAVIORAL)			General Managers(N=48) (AFFECTIVE)			General Managers(N=48) (BEHAVIORAL)		
	UQ*	M*	OQ*	UQ*	M*	OQ*	UQ*	M*	OQ*
Job Satisfaction	5.4	5.6	5.1	6.0	6.3	6.0	6.1	6.1	6.1
Job Performance	5.6	6.0	6.0	6.0	5.7	6.0	5.8	6.1	5.8
Salary****	1.5	1.6	1.4	1.4	1.8	1.5	1.5	1.6	1.9

UQ-Underqualified, M-Matched, OQ-Overqualified

****Salary means for engineers are: 1=below $30,000, 2=above $30,000

Table 5-35

Job Satisfaction, Job Performance and Salary Means for Direct Service and Administrative Social Workers

	(AFFECTIVE) Direct Service(N=38)			(AFFECTIVE) Administrative(N=48)		
	UQ*	M*	OQ*	UQ*	M*	OQ*
Job Satisfaction	5.5	6.5	5.0	5.8	6.0	6.0
Job Performance	6.0	6.3	6.0	5.8	5.9	5.5
Salary****	1.3	1.2	1.1	1.3	1.5	1.7

UQ-Underqualified, M-Matched, OQ-Overqualified

****Salary means for social workers are: 1=below $20,000, 2=above $20,000.

TABLE 5-36

GROWTH CLIMATE MEANS FOR ENGINEERS AND SOCIAL WORKERS

Job Roles	Pivotal Competency Areas	Growth Climate Means		
Social Workers		Underqualified	Matched	Overqualified
Direct Service (n = 38)	Affective	4.5	4.8	3.7
Administrators (n = 48)	Affective	4.8	5.2	5.1
Engineers				
Bench Engineers (n = 73)	Perceptual	3.9	5.0	4.8^{**}
Technical Managers (n = 78)	Affective	4.6	5.1	4.3^{***}
	Perceptual	4.8	4.8	4.6
	Behavioral	4.8	5.1	4.1^{**}
General Managers (n = 48)	Affective	5.2	5.7	5.0
	Behavioral	5.6	5.3	5.0

* $p \leq .10$

** $p \leq .05$

*** $p \leq .01$

**** $p \leq .001$

Experiential Learning Theory has demonstrated its usefulness in measuring the person and job in commensurate terms by using the model of four performance competency areas. Both generic skills of the individual and of the job were identified as being Affective, Perceptual, Symbolic, or Behavioral performance competencies. Not only were individual skills and competencies required to effectively perform the job identified but valid differences in occupations were also identified through the use of this four factor model.

There are important problems and limitations in the current taxonomy, however, that need to be addressed in future research and development. First, the current data are all based on respondents' self analysis and report. More behavioral and observational means need to be developed to assess these competencies, as well. Secondly, the perceptual competencies in the current model are of questionable validity since they do not correlate with the LSI Reflective Observation scale. Part of this difficulty stems from the wording of the items (e.g., respondents keyed on "thinking and doing" rather than the intended "creating new ways" in Item e). In addition, it is possible that work environments are predominantly organized around active as opposed to reflective learning heuristics and that perceptual complexity as a result plays a minor role in performance competencies at work. Thirdly, more work needs to be done on the ecological validity criteria. Some competencies seemed to work well in this respect in educational environments but not in work environments, e.g., designing experiments. Others seemed relevant to work and irrelevant to education, e.g., seeking and exploiting opportunities. In addition, it is doubtful whether the current list encompasses all important performance competencies in all jobs.

Some progress on these limitations can be seen in a follow-up study conducted with social work and engineering graduates in the Professional School Study (see Section III-B). As a result of the analysis of the alumni data described above, the list of performance competencies was revised and expanded to include new performance competencies associated with the four learning competencies (e.g., "influencing and leading others" in the behavioral area). Special emphasis was placed on adding to the list of performance competencies that might relate to perceptual complexity. These additions were "working in groups," "listening with an open mind," "able to adapt to changing circumstances," "imagining implications of ambiguous situations," "seeing how things fit in the big picture" and "listening to others." In this study all of these additions were significantly related to perceptual complexity (see Kolb, in press). Some of this success must be attributed to better descriptions of the competencies, but the differences between working and student samples must also play a part here.

The results here nonetheless provide much promise for the use of Experiential Learning Theory as a framework for measuring the person and job in the same terms and identifying the pivotal skills required for effective job performance. They have also contributed to a fuller understanding of Lewin's B = f (P,E) paradigm. This study would suggest that match, in general, between P and E is desirable, but that mismatch is not necessarily undesirable. Being mismatched in an overqualified manner appears to have undesirable consequences, much like Manring's (1979) "underwhelmed" engineers. Yet a mismatch creating an under qualified situation may have positive consequences with regards to motivation, use of growth climate, etc. Finally, while not directly studied here, it is hard to conceive of a permanent fit or match being desirable. One may reach a "match" situation in one job, only to be promoted to a new one, where the interaction begins with a mismatch. This dynamic sense of Lewin's paradigm raises more complex questions concerning how one managers person-job interaction over time in one job and over time across jobs. The fact that our model and measures of P and E variables have led us to these questions poses promise for this emerging theory, the measures, and for the overall "person-environment" framework as worthy of continued inquiry and research.

VI. Professional Education and Career Development

A. Introduction

This part of the report focuses on the impact of professional education on the career development of the social workers and engineers in our alumni samples. The choice to study these professional career paths was dictated by three considerations. The first consideration is based on the fact that relationships between professional training and later work is much clearer than it is in academic fields where training, in mathematics for example, may lead to any number of occupations. Therefore, since the manifest intent of professional training is clearly to prepare individuals for careers in the given profession, we should be able to see more clearly the relationship between education and career performance. Secondly, those who enter professional training are usually more committed to a career in the professional field. This commitment allows us to focus more clearly on career development in a specialized career path and to study the consequences of early specialization on later career adaptation. Thirdly, professional education through its own process of self examination and through social criticism and student evaluation has identified a number of criticial problems which seem to bear directly on the career development process. Schein has summarized these as follows:

1. The professions are so specialized that they have become unresponsive to certain classes of social problems that require an interdisciplinary or interprofessional point of view--e.g., the urban problem.

2. Educational programs in professional schools, early career paths, and formal or informal licensing procedures have become so rigid and standardized that many young professionals cannot do the kind of work they wish to do.

3. The norms for entry into the professions have become so rigid that certain classes of applicants such as older people, women, and career switchers are, in effect, discriminated against.

4. The norms of the professions and the growing base of basic and applied knowledge have become so convergent in most professions that it is difficult for innovations to occur in any but the highly specialized content areas at the frontiers of the profession.

5. Professionals have become unresponsive to the needs of many classes of ultimate clients or users of the services, working instead for the organization that employs them.

6. Professional education is almost totally geared to producing autonomous specialists and provides neither training nor experience in how to work as a member of a team, how to collaborate with clients in identifying needs and possible solutions, and how to collaborate with other professionals on complex projects.

7. Professional education provides no training for those graduates who wish to work as members of and become managers of intra- or interprofessional project teams working on complex social problems.

8. Professional education generally underutilizes the applied behavioral sciences, especially in helping professionals to increase their self-insight, their ability to diagnose and manage client relationships and complex social problems, their ability to sort out the ethical and value issues inherent in their professionals role, and their ability to continue to learn throughout their career (1972, p. 59).

Social work and engineering were chosen as specific professions for study because they represent the clearest examples of social and science based professions. Thus, we can examine specialized education in two basic adaptive styles, the accommodative style in social work and the convergent style in engineering, and examine the consequences of this education on later career development.

The science based professions and especially engineering, require a highly developed capacity for working with abstract conceptualizations in the utilization of advanced technology for solving real world problems. The work itself results not so much in further conceptualization (the province of the basic sciences) but rather in action taken to solve practical problems and to develop and construct physical structures, products, and technical processes. Thus, a well developed competence in active experimentation is equally essential for effective work in the science based professions. The adaptive competencies--symbolic complexity, and behavioral complexity--combined to make up the convergent style which is the forte of the professional engineer.

Career advancement for engineers often involves a promotion to managerial positions which generally require a substantially different mix of competencies. Much less of their time is devoted to the direct application of scientific knowledge. While there is a continuing concern for action, the focus is much more on the concrete realities of managing people, planning for various contingencies, setting priorities, and handling administrative details. The emergent need, in this transition to management, is for increased competence in handling the complexities and vagaries of concrete experience. The convergent modality must give way to an accommodative style of adaptation, based on competencies in affective complexity (concrete experience) coupled with behavioral complexity (active experimentation).

Professional work in human services fields (e.g., social work) is predicated on highly developed accommodation skills. The emphasis is on dealing with the social and emotional complexities of people in need. The helping process calls for heightened sensitivity to the concrete realities of the human condition matched with active problem-solving. These generic competencies are required for the effective delivery of services to the disadvantaged, the troubled, and the needy.

Career advancement for human service professionals may also involve taking on managerial responsibilities, but in this case a change in basic adaptive style may or may not be required. While a newly appointed director of a social agency generally has many new things to learn, his/her accommodative style is generally appropriate for most of the developmental agenda in this transition. Nonetheless, for many who are promoted from direct service delivery to administrative or policy formation assignments, some increase in abstract analytic competencies is called for. One must back away from some of the concrete details of individual cases in order to gain a larger perspective. The basic accommodator style begins to require a back-up of converger skills or perhaps even assimilator (social planning) skills. Since a major focus of our research is how professional education prepares individuals not only for early career demands but also for the often quite different demands of later career responsibilities, the different structure of career paths in these two fields offers contrasts of great interest.

Contributions of education and work to learning. Since the major theoretical framework of our studies is learning as a life long process, we were intially interested in the social work and engineering alumni views about how they had developed their current portfolio of competencies. The alumni questionnaires (Appendix A) asked respondents to rate how much their professional education at CWRU had contributed to the development of each of the performance competencies described in Section IV-C and how much their work experience had contributed to the development of these competencies. Their responses were plotted on the competency circle described in Section IV-C. Figure 6-1 shows the results of this analysis for engineering alumni. The dark shaded area represents contributions of professional education to competencies, while the lined area shows contributions of work experience to the development of competence. The dark line shows the average current job demand for each competency. The figure shows dramatic differences in the competencies acquired in education and work. Engineering education seems to prepare or in several cases overprepares individuals for the demands of their job in symbolic and perceptual competencies but makes little contribution to the development of affective and behavioral competencies. These seem to be acquired primarily in the work setting.

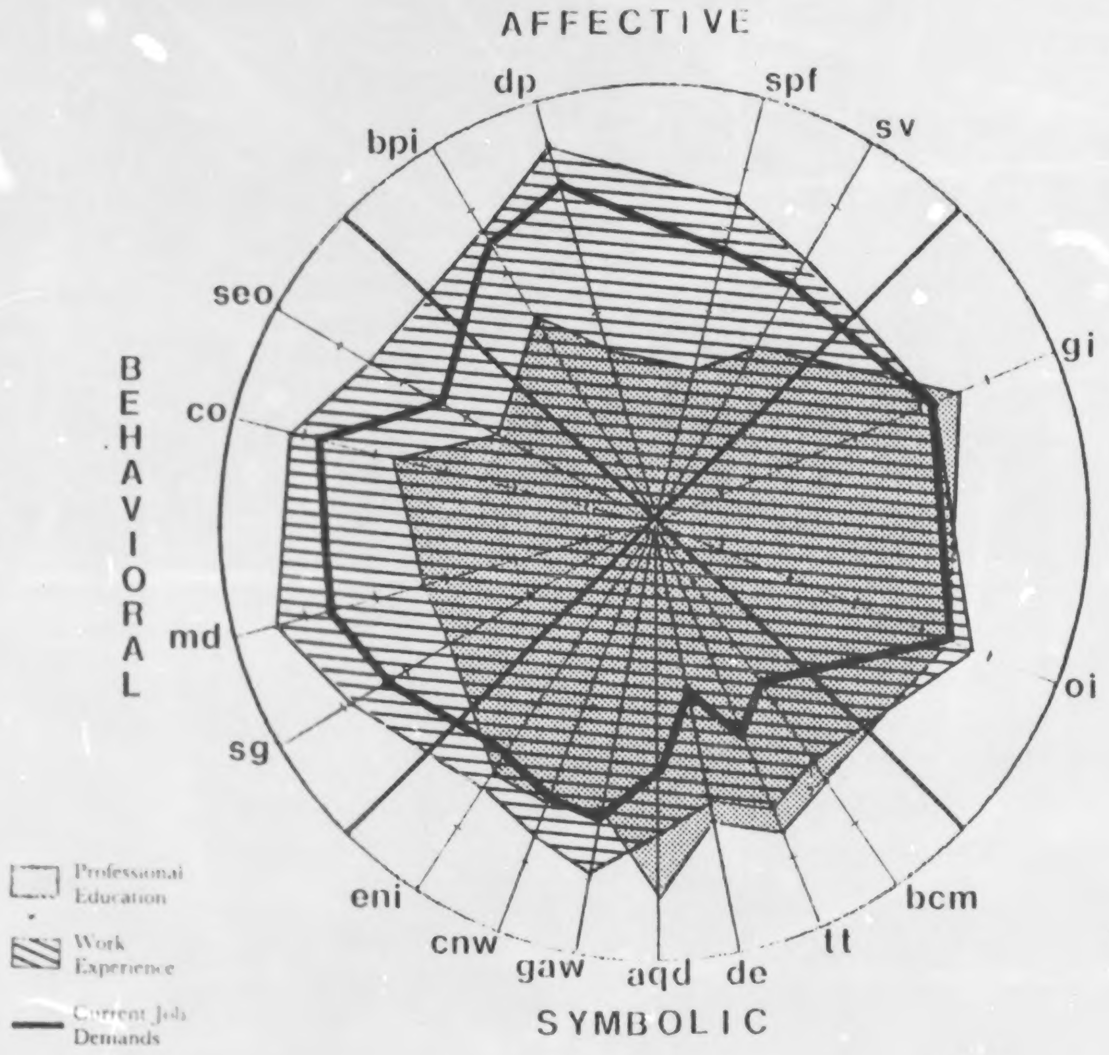
Figure 6-2 shows the same analysis for social work alumni. Here the shaded area representing the contribution of social work professional education is larger than in engineering but still biased toward the development, of perceptual and symbolic skills. Work experience contributes more to the development, of affective and particularly behavioral skills as in the engineering figure.

Surprisingly these patterns were not significantly different for different alumni years; alumni only three years out of school (class of 1975) showed the same pattern as alumni 23 years out (1955). Engineering alumni in all cohort groups reported that their professional education emphasized the development of symbolic and perceptual skills while neglecting affective and behavioral skills. Social work alumni in all cohort groups felt that their professional education had developed required competencies in the affective, perceptual and symbolic areas but had neglected the development of behavioral competencies. Both social work and engineering alumni consistently felt that they had made up for these deficits as well as supplemented their strengths through experiential learning on the job.

These results suggest both the reality of life-long learning and development and the tendency of professional education to prepare students for specialized entry level jobs rather than careers. For example, Miller (1979) found that 74% of engineering alumni from the class of 1975 held engineering jobs while only 26% of the class of 1955 were still engineers. 74% of the class of 1955 were in managerial positions while only 26% of the 1975 class were managers. As can be seen from Figure 6-3, showing the average performance competency job demands by learning mode, managerial jobs require increased demands for affective and behavioral competencies. These competencies are not acquired in professional engineering education and thus must be developed through work experience.

The remaining two parts of this section examine the questions raised by these data in further detail. Part B examines how education in social work and engineering shapes the development of the learning competencies of experiential learning theory and reports the impact of this shaping on career adaptation. Part C uses data from the interview samples to examine adult development for these professionals as a transition from specialization to integration.

Figure 6-1: Contributions of Work Experience and Professional Education to the Development of the Performance Competencies of Engineering Alumni



Work Abilities Index

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bpi	being personally involved
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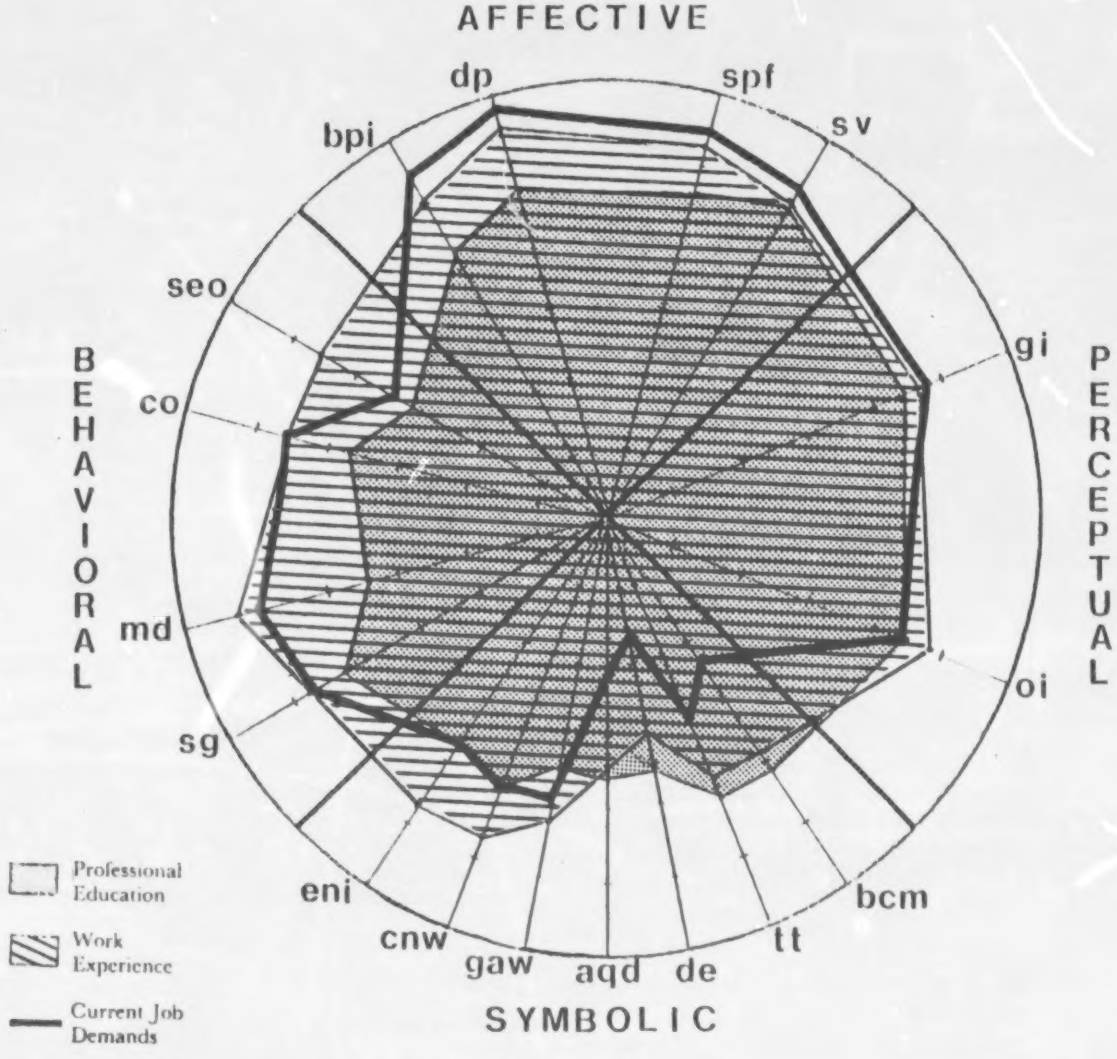
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

Figure 6-2: Contributions of Work Experience and Professional Education to the Development of the Performance Competencies of Social Work Alumni



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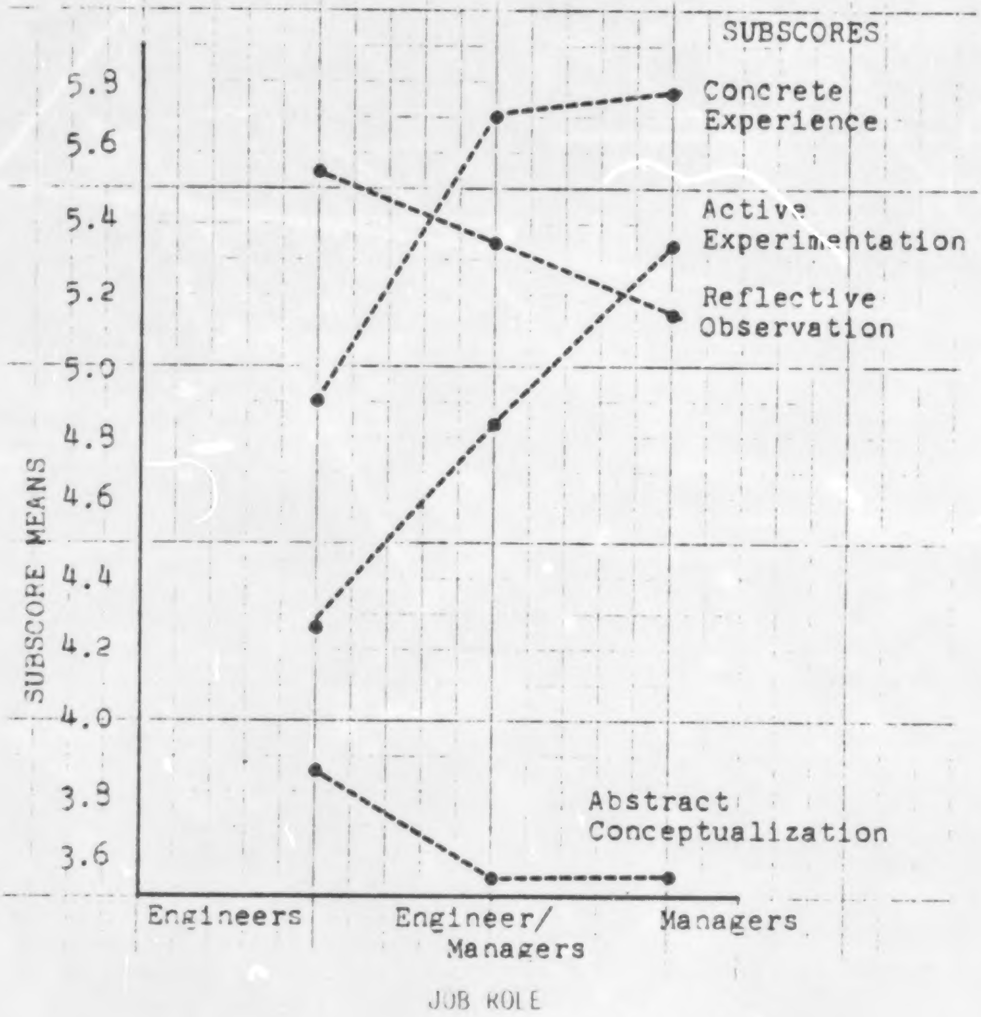
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

Figure 6-3: Average Performance Competency Scores by Job Role - Engineering Alumni



B. Professional Education as Preparation for Professional Jobs and Changing Career Roles

David Kolb and Ronald Sims*

The aim of this study is to assess how effectively professional education prepares individuals to meet professional job demands and to adapt to lifelong careers with changing job roles. The focus of the research is on learning; on how professional education shapes and develops learning competencies and on the impact of these generic learning competencies on the development of the performance competencies needed for successful performance in the changing job roles that comprise professional careers in social work and engineering.

From a social control point of view, professions seem to have originally emerged in the areas of human activity, e.g., medicine, religion, law, where it is not feasible to judge performance on the basis of outcomes. Since one cannot judge a doctor on whether or not a specific patient dies or a lawyer on whether a specific case is won or lost the emphasis in professions is on controlling the means of performance rather than the outcomes. One is therefore professionally competent if he or she performs the accepted professional activities or methods adequately regardless of their results. As professions have expanded into other areas of human activity this emphasis on means and methods has been retained. One result of this emphasis on means of performance is that schools of professional education have the primary responsibility for the development and certification of professional competence. While programs of peer review, periodic licensing and continuing education are now appearing in some profesions; for the most part the professional student on graduation is presumed competent for life. This responsibility causes professional schools to make every possible effort to incorporate the appropriate knowledge, skills and attitudes deemed necessary for professional competence. As a result the process of socialization into a profession becomes an intense experience that instills not only knowledge and skills but also a fundamental reorientation of one's identity.

We refer to this orientation as a professional mentality. This mentality is pervasive throughout all areas of the professional's life - it includes standards and ethics, the appropriate ways to think and behave, the criteria by which one judges value, what is good and bad. Learning style is an important part of professional mentality. It represents the generic learning competencies that facilitate the acquisition of the specific performance skills required for effectiveness in the core professional role. Research by Kolb (1976) has demonstrated important differences in the structure of knowledge between science based professional education such as engineering and social professions such as social work. Each of the areas create demand characteristics that the learner must cope with and that shape the learner's learning style. Empiricism is the dominant philosophy and correspondence the main criteria for truth in the science based professions. Manring (1979) described the professional mentality of engineers as an objective scientific-planning attitude toward rationality. An individual who is attracted to the engineering field tends to be an object-oriented, data-base thinker, whose most typical problem solving approach is thinking-sensing, e.g., analytical and factual (Mitroff, 1975). Research by Kolb (1981) identified engineering learning styles as falling predominantly in the convergent quadrant. In social professions the dominant philosophy is pragmatism, truth is defined by workability. Kolb (1981) has also shown that social workers' learning styles predominantly fell in the accommodative quadrant. Through processes of selection and socialization professional schools make every effort to insure [illegible] professional mentality in its graduates. This education is a major [illegible] control on the quality of professional service.

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A problem arises, however, when we consider the nature of professional careers in a rapidly changing society. Few professionals remain for a lifetime in the core professional role for which they were trained. In engineering, for example, the typical career path requires a transition to management, a job role requiring a different portfolio of competencies and a different learning style from the convergent professional mentality so suited to engineering work. The life long career perspective poses a serious dilemma for professional education. Should it continue to emphasize intensive socialization in the specialized role requirements of the profession or should some of this rigorous training give way to the broader development of learning competencies required for life long learning. The choice for broader development may mean less specialized education at a time when the knowledge required for professional competence is increasing. The specialized choice may result in professional deformation - in the intensive over-learning of a specialized professional mentality that actively hinders adaptation to the changing requirements of one's career.

It is this problem of career adaptation that we wish to examine in this paper. Robert Altmeyer (1966) has dramatically illustrated one aspect of the potential problem in his comparative study of engineering/science and fine arts students at Carnegie Tech. In a cross sectional study he administered two batteries of tests to students at all levels in the two schools -- one battery measured analytical reasoning, the other creative thinking. As predicted, engineering/science students scored highest on analytic reasoning and fine arts students highest on creative thinking; over the college years these gaps widened, engineering/science students became more analytical and arts students more creative. The surprising finding was that engineering/science students decreased in creative thinking and fine arts students decreased in analytic reasoning over college years. Thus, educational processes that accentuated one set of cognitive skills also appeared to produce loss of ability in the contrasting set of skills. Altmeyer's study suggests that specialized education can lead to a loss of neglected skills. Education can produce minuses as well as pluses. A second problem of career adaptation stems from the intensive socialization process that characterizes many programs of professional education. To the extent that the specialized professional mentality inculcated in the student becomes a central part of his or her identity that student may become inflexible and intolerant toward styles that conflict with that mentality. This rigidity may actively inhibit one's ability to adapt to changing career demands. This problem would seem to be most serious for the established paradigmatic professions that have clearly identified "ways of doing things."

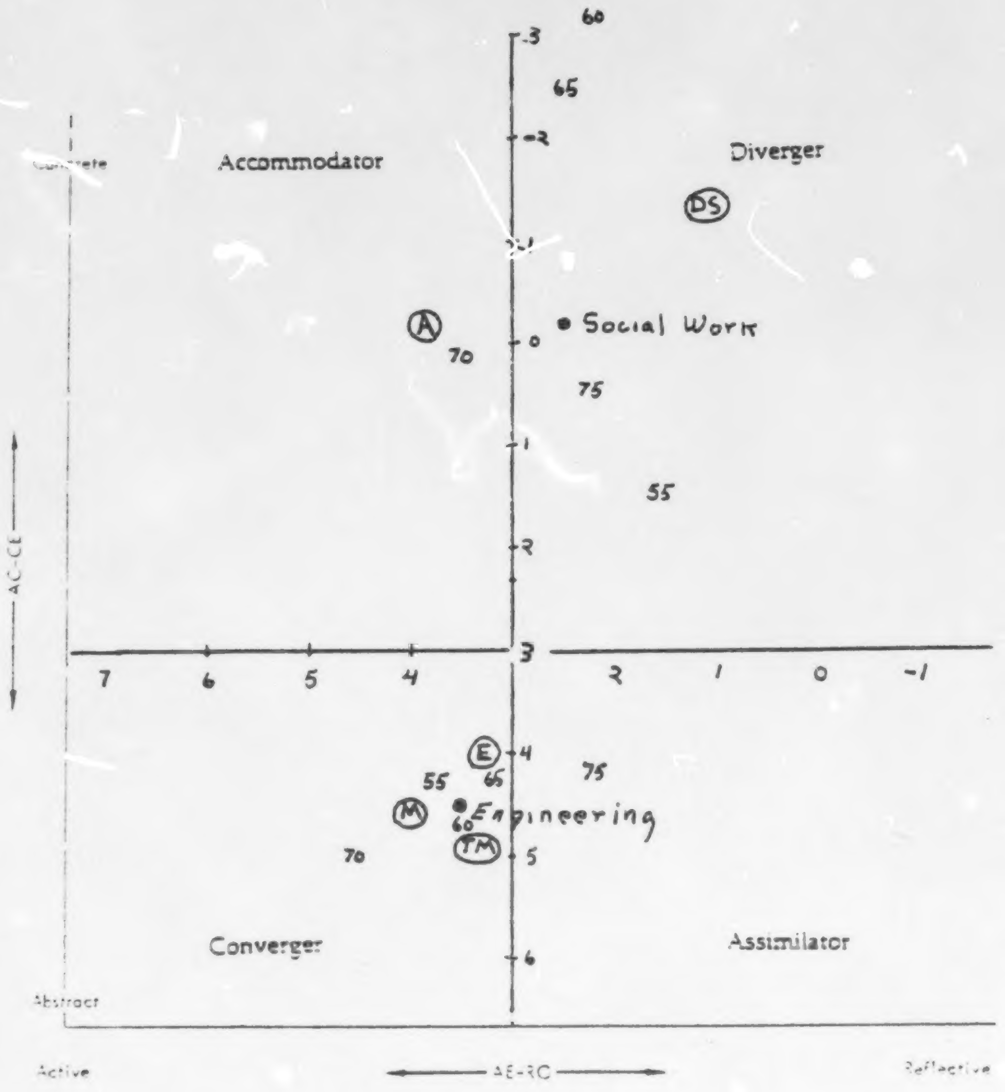
To examine the learning process in professional careers and the current success of career adaptation in the professions of engineering and social work, we propose to test six hypotheses using data from the alumni survey sample described in Section III A. Hypotheses 1 through 3 address how learning styles are shaped; Hypotheses 4 and 5 address the nature of careers and Hypothesis 6 addresses the issue of career adaptation.

Hypothesis 1 - Professionally educated engineers' learning styles will be predominantly convergent. Professionally educated social workers' learning styles will be predominantly accommodative. Hypothesis 1 if confirmed will add further support to the findings of previous research (Kolb, 1976, 1981). Figure 6-3 and Table 6-1 show average LSI scores for engineering and social work alumni. Engineering alumni are primarily convergent in their learning style as predicted while the average social work alumni scores falls on the dividing line between the diverger and accommodator quadrant. Table 6-2 shows that 41% of engineers were convergers with another 28% falling in the assimilator quadrant. 29% of social workers were accommodative and 34% were divergent in their learning style. Thus, for the abstract/concrete dimension Hypothesis 1 is confirmed for both professions but on the active/reflective dimension Hypothesis 1 is confirmed only for engineering. Social workers are significantly less active than engineers, contrary to our predictions.

We were surprised to find no differences between the LSI scores of alumni in different cohort years in either social work or engineering. In engineering cohort year means are closely bunched around the engineering average. Cohort means for social work are more dispersed but still are not significantly different from each other (see Figure 6-3 and Table 6-3). Thus age and years of working alone do not seem to effect learning style for either of these professional groups.

In engineering there were also no significant differences in learning style by job role. Both social workers and engineers were divided into different job roles based on the job they currently held. Social workers

Figure 6-4: Learning Style Inventory Scores
for Engineers and Social Workers
by Alumni Year and Job Role



Job Role Code:

DS - Direct Service
A - Administrator
E - Engineer
TM - Technical Manager
M - Manager

TABLE 6-1

Comparison of Means for Social Workers and Engineers on Learning Style Inventory

Group		AC - CE		AE - RO	
	N	$\bar{x}$	σ	$\bar{x}$	σ
Social Workers	11	-.18	6.77	2.48	5.14
Engineers	270	4.56	5.31	3.61	5.19
	T-test signf. $\bar{x}$		-6.49 $p < .01$	T-test on signf. $\bar{x}$	-2.00 $p < .05$
	F-test on variance		1.60 $p < .01$	F-test on variance	1.00 NS

TABLE 6-2

Chi-Square of Learning Styles for Social Workers and Engineers

Group	Acc.	Div.	Asm.	Conv.	x^2	p
Social Workers	30 (29%)	35 (34%)	16 (16%)	22 (21%)	7.8	$< .05$
Engineers	46 (19%)	29 (12%)	68 (28%)	99 (41%)	11.35	$< .01$

TABLE 6-3

LSI Means and Standard Deviations for Social Workers and Engineers by Year of Graduation

			AC - CE		AE - RO	
	Year	n	$\bar{x}$	σ	$\bar{x}$	σ
Social Workers	1975	39	.36	5.98	2.18	5.23
	1970	31	.10	6.80	3.52	4.98
	1965	13	-2.54	6.97	2.46	6.78
	1960	9	-3.22	5.31	2.22	3.42
	1955	19	1.31	8.43	1.57	4.84
	TOTAL	111	-.18	6.77	2.48	5.14
	ANOVA F prob.		.33		.74	

			AC - CE		AE - RO	
	Year	n	$\bar{x}$	σ	$\bar{x}$	σ
Engineers	1975	33	4.24	4.97	2.09	4.79
	1970	62	5.03	5.17	4.59	4.87
	1965	52	4.44	5.66	3.23	4.60
	1960	69	4.58	4.89	3.46	5.89
	1955	54	4.30	5.94	3.94	5.24
	TOTAL	270	4.56	5.31	3.61	5.19
	ANOVA F prob.		.94		.23	

were divided into two job role categories: 1) Direct Service - social workers providing direct service to clients, and 2) Administrators - social workers serving in managerial or administrative positions. Engineers were divided into three job role categories: 1) Engineers - engineers in non-managerial positions responsible for completing technical task assignments, 2) Technical Managers - responsible for completing technical assignments through supervision of other engineers, and 3) Managers - individuals who are involved in specialized management positions, such as financial management of their own engineering firms. Engineering alumni showed similar learning styles regardless of their job role. There was, however, a significant difference between social work administrators and direct service social workers. On the active/reflective dimension ($F = 5.17$ $p < .02$) administrative social work alumni were accommodative in their learning style while direct service alumni were divergent.

Hypothesis 2 - Social workers will be less homogeneous than engineers in their learning styles. This hypothesis is based on the assumption that social work profession is a less established and paradigmatic profession than engineering. Schein (1972) identified three trends of maturing professions: 1) they become more convergent in their knowledge base and standards of practice; 2) they become more highly differentiated and specialized; and 3) they become more bureaucratized and rigid with respect to the career alternatives they allow. The above hypothesis tests whether or not the maturity of a profession impacts LSI scores preferences. Social workers should have less homogeneous learning style scores than engineers. An F-test of the variance in learning style score for the social work and engineering groups was done to see whether the two groups were significantly different. The F-test shows a significant difference in learning style variances on the abstract/concrete dimension with an F for AC-CE of 1.60 (see Table 6-1), but no difference on the active/reflective dimension. Table 6-2 provides another way of looking at homogeneity of the professions. In the engineering profession there is a high concentration of alumni as predicted with 41% in the convergent quadrant and 69% in abstract styles. In social work the percentages are much more dispersed although (63%) fall in concrete as opposed to abstract quadrant.

Hypothesis 3 - There should be less homogeneity in the learning styles of the 1955 social work and engineering cohort group as opposed to the 1975 social work and engineering cohort group, since 1955 cohort should have developed broader adaptive abilities over the course of their career. According to the Experiential Learning Theory of career development, individuals as they mature should begin to express their non-dominant styles. Therefore we would expect engineers to move toward other (non-dominant) quadrants and social workers should also develop more adaptive abilities.

Based on the LSI standard deviations and means for social workers it cannot be concluded that there is significantly less homogeneity in 1955 cohort group as opposed to the 1975 cohort group (see Table 6-3). The same finding holds true for engineers. There is no significant difference among the means or variance of cohort years within either engineering or social work further reinforcing the conclusion that age and years of work alone do not impact the learning style of professionals.

Hypothesis 4 - Career paths in social work and engineering will move from direct professional work to managerial work. More people in the 1955 cohort group will be in managerial positions than in the 1975 cohort group. This hypothesis will test whether or not there are indeed changing job roles and job demands along career paths and provide additional information on the nature of career paths in social work and engineering. As can be seen in Table 6-4, 50% of social workers of 1955 cohort group are in managerial positions while 43% of 1975 cohort group are in managerial positions. For engineers 76% of 1955 cohort group are in managerial positions while only 31% of 1975 cohort group are in managerial positions. In addition, there is an increase in percentage of managerial positions for 1975 through 1960 cohort groups. Hypothesis 2 is confirmed for engineers but not for social workers.

Hypothesis 5 - The different job roles comprising careers in engineering and social work will require different portfolios of performance competencies. Engineering jobs will predominately require the convergent competencies associated with the symbolic and behavioral learning competencies. Managerial jobs in engineering will require more affective and behavioral competencies. Direct service social work will demand highly developed affective competence while administrative jobs will emphasize behavioral competencies more. Job demands will be assessed using the competency circle profile described in Section IV-C. To test the hypothesis, one way analysis of variances were done between the job demands of the different job roles in social work and engineering and the mean scores were plotted on the competency circle graphs (Figures 6-4 and 6-5). (The abbreviated letters used on the circle graph are defined in Section IV-C). Figure 6-4 shows great differences in the job roles in engineering careers. Using a Scheffe procedure at .05 level, the significant subsets between job roles are circled. As can be seen in Figure 6-4 engineers in different job roles do perceive their jobs as actually having different demands in the competencies of dealing with people, being personally involved and being sensitive to people's feelings; seeking and exploiting opportunities, making decisions and setting goals; designing experiments and testing theories; gathering information. Generally managerial jobs require greater affective and behavioral competencies while direct engineering work requires greater symbolic and perceptual competencies.

For social workers the ANOVA procedure showed significant differences between job roles on making decisions, seeking and exploiting opportunities,

TABLE 6-4

Percentages of Social Workers and Engineers in Managerial Positions by Cohort Group

Social Workers

Job Role	Cohort 1975	1970	1965	1960	1955	Row Total
Direct Service Social Worker	20	9	3	3	8	43 46.7
Administrators	15	16	5	5	8	49 53.3
Column Total	35	25	8	8	16	92 100.0
Per cent Managers	(43%)	(64%)	(63%)	(63%)	(50%)	

Engineers

Job Role	Cohort 1975	1970	1965	1960	1955	Row Total
Engineers	20	21	17	6	11	75 36.4
Technical Managers	8	16	20	24	13	81 39.3
Managers	1	9	7	12	21	50 24.3
Column Total	29	46	44	42	45	206 100.00
Per cent Managers	(31%)	(54%)	(61%)	(86%)	(76%)	

Figure 6-5: Comparison of Job Demands for Engineers, Technical Managers and Managers

Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals

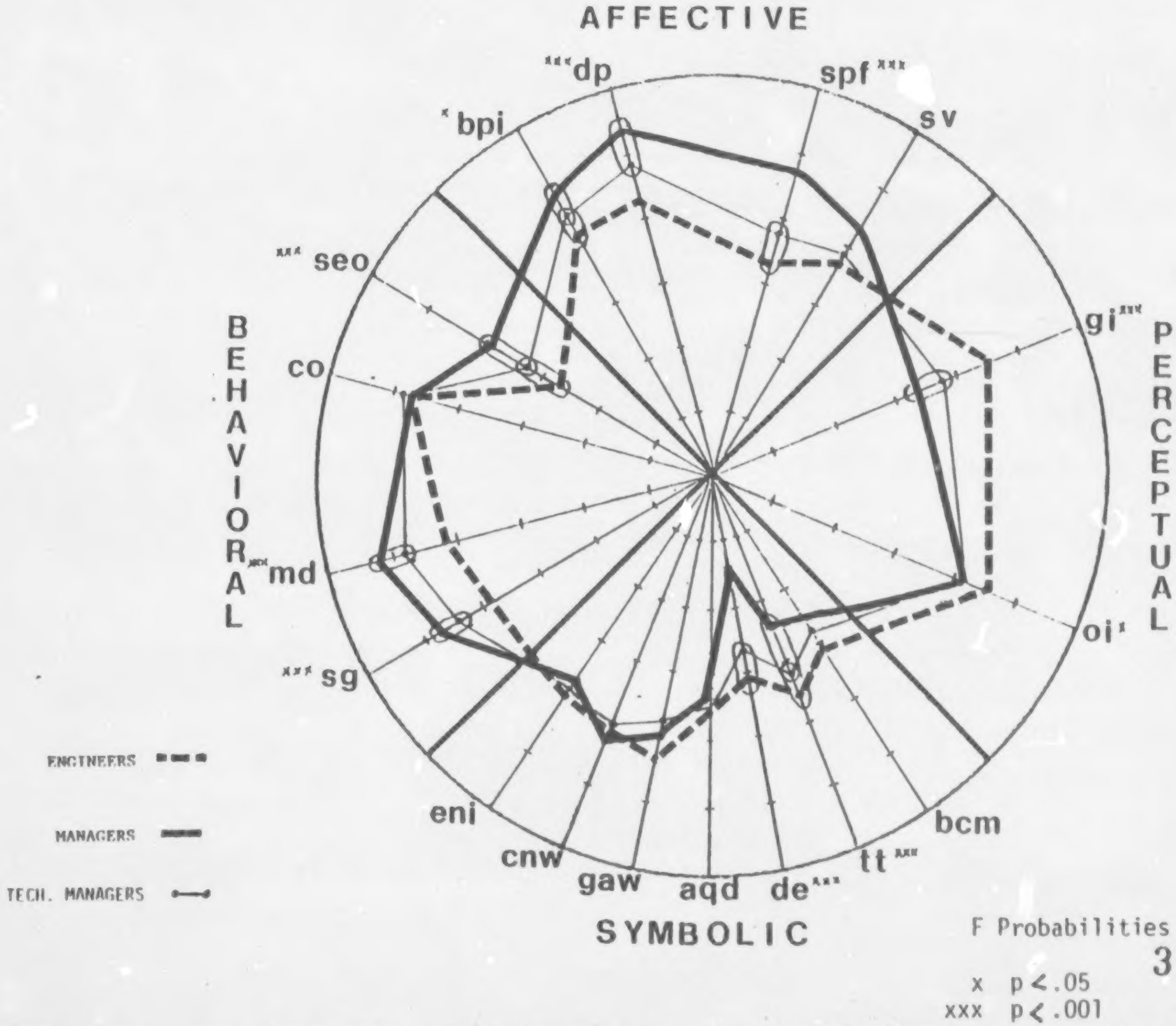


Figure 6-6: Comparison of Job Demands for Administrators and Direct Service Social Workers

Work Abilities Index

Affectively Related

bpi	being personally involved
dp	dealing with people
spf	being sensitive to people's feelings
sv	being sensitive to values

Perceptually Related

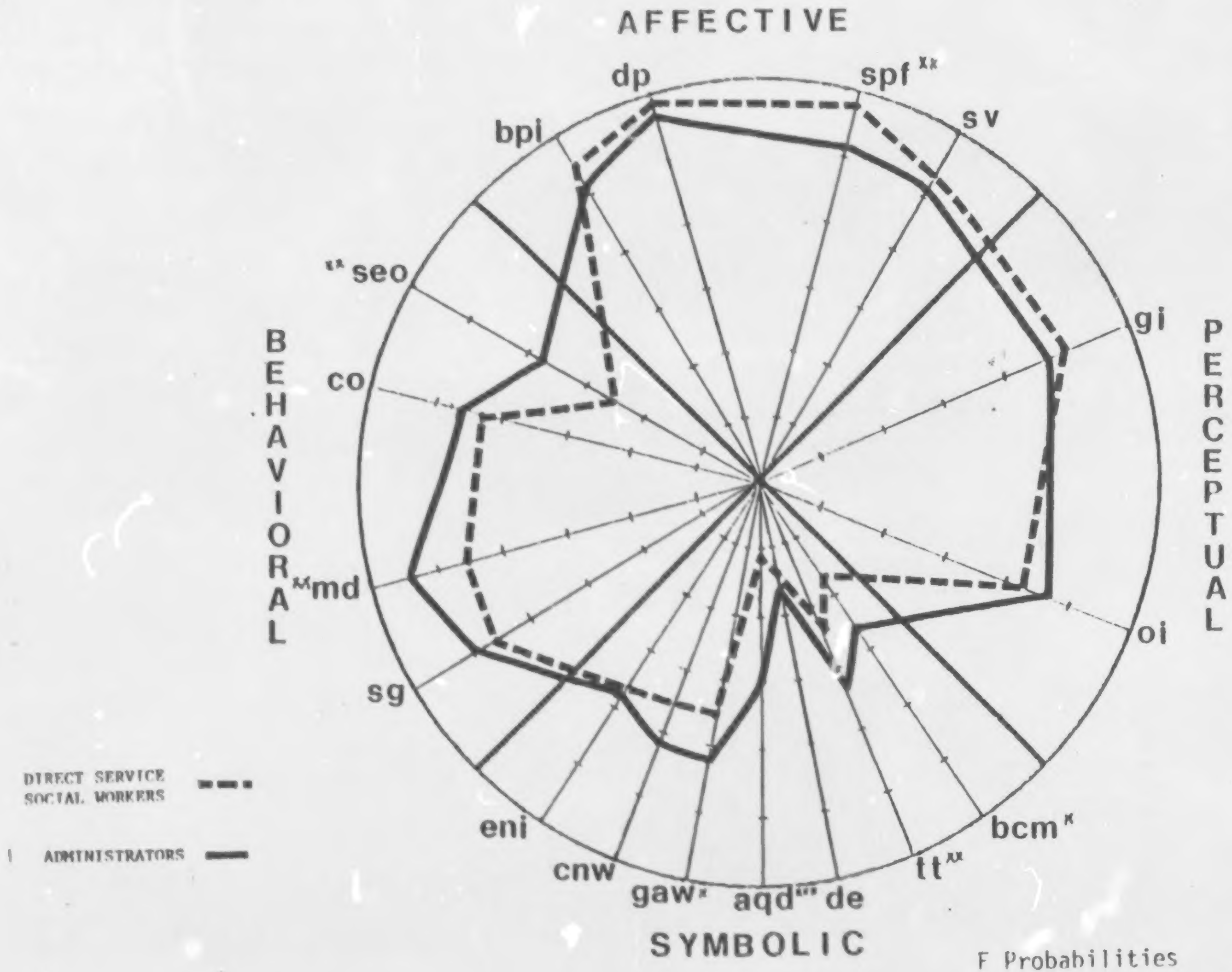
gi	gathering information
oi	organizing information

Symbolically Related

eni	experiment with new ideas
cnw	create new ways of thinking and doing
gaw	generate alternative ways of thinking and doing
aqd	analyzing quantitative data
de	designing experiments
tt	testing theories and ideas
bcm	building conceptual models

Behaviorally Related

seo	seeking and exploiting opportunities
co	committing yourself to objectives
md	making decisions
sg	setting goals



F Probabilities

x $p < .05$
xx $p < .01$
xxx $p < .001$

analyzing quantitative data, sensitivity to people's feelings, and testing theories and ideas (Figure 6-5). Direct service social workers and administrators perceive jobs as having different job demands. Direct service professionals self-perception of their job demands show that they see their jobs more demanding affectively than administrators perceive their jobs, while administrators perceive their jobs as more demanding behaviorally, e.g., seeking and exploiting opportunities, committing themselves to objectives and making decisions.

Hypothesis 6 - The lack of career adaptability in engineering will be indicated by percentage of engineering alumni in managerial roles who see themselves as underqualified in affective and behavioral competencies. Career adaptation in social work will be indicated by the percentage of administrators who rate themselves as underqualified in the behavioral competencies. The reasoning here is as follows: We know from Section VI-A, Figure 6-1, that engineering education develops symbolic and perceptual competencies while behavioral and affective competencies are acquired via work experience. The extent to which this does not happen in managerial jobs that require these competencies (see Figure 6-4) represents an inability on the part of engineers to adapt to the demands of changing career roles. Similarly for social workers we saw in Section VI-A, Figure 6-2 that it was behavioral competencies that were neglected in professional education and thus had to be acquired via work experience. The failure to acquire these competencies in administrative social service jobs that require them at high levels of proficiency (see Figure 6-5) is the corresponding measure of a lack of career adaptation in social work.

By comparing alumni self ratings of their work abilities with their description of the demands of their current jobs it is possible to determine the percentage of alumni in different job roles who see themselves as being underqualified in each of the four clusters of performance competencies. This data is shown in Table 6-5.

The data for engineers suggest problems in career adaptation. One third or more of the technical managers and managers in the engineering alumni sample report that they are underqualified in affective and behavioral competencies.

These percentages are greater than the corresponding percentages of bench engineers who are underqualified in affective and behavioral competencies suggesting that the large number of underqualified managers in these areas results from a failure to learn how to respond to the increased demands characteristic of managerial jobs (Figure 6-4). The fact that the number of affectively and behaviorally underqualified managers is greater than symbolically and perceptually underqualified managers suggests that professional education more adequately prepares professionals in symbolic and perceptual competencies than in affective and behavioral competencies suggesting a form of professional deformation.

In social work, 44% of the administrators report that they are underqualified in the behavioral competencies. The increase in the number of behaviorally underqualified managers over behaviorally underqualified direct service social workers would seem to result from a failure to learn how to respond to the increased behavioral demands of administrative jobs (see Figure 6-[illegible]). However, a large percentage of administrators see themselves as underqualified in the other three areas of competence as well as in the behavioral area neglected in professional social work education (Figure 6-2). This suggests that failures of career adaptation in social work are as much as result of a generalized lack of competencies to deal with the very difficult professional tasks in the administrative role as they are a result of professional deformation.

Discussion and Conclusion. Experiential learning theory provides a useful framework for describing and assessing the competencies required for the different job roles in careers associated with the professions of social work and engineering. Professional education in these fields selects and develops distinctive learning competencies that can be described by Learning Style Inventory responses. Social work and engineering differ widely in the professional mentality they develop. Social work is highly concrete in its orientation befitting its people orientation, while engineering is highly abstract reflecting its scientific emphasis. Both professions are actively oriented although there were more reflective social work alumni in this sample than predicted. This reflective emphasis may be a result of the therapeutic emphasis of the CWRU School of Applied Social Science. In any event, it is significantly associated with the direct service job role which is personal counseling oriented.

We have shown that there is greater similarity in learning style among engineering alumni than social work alumni. Our conclusion is that this homogeniety is a result of the fact that social work is a less established and less paradigmatic profession than engineering. This greater similarity in the learning style of engineering alumni extends throughout the whole sample - there is no difference in learning style across cohort years and job types. In social work cohort years are more widely dispersed, although not significantly different: and administrative jobs are significantly more active than direct service jobs.

Engineering and social work seem to have very different career paths. In engineering there is a definite general progression from direct engineering work to managerial positions over the cohort years, while social work appears to have two tracks: administrative and direct service that begin in graduate school and continue equally in early and late career with no distinct progression from one role to the next.

The job roles in engineering and social work require quite different portfolios of performance competencies. Administrative and managerial jobs across the two professions are very similar requiring highly developed

TABLE 6-5

Per Cent of Individuals in Different Job Roles
Whose Work Abilities Do Not Meet Job Demands.

		JOB DEMANDS			
	JOB ROLES	AFFECTIVE	BEHAVIORAL	SYMBOLIC	PERCEPTUAL
ENGINEERING	Engineer	24%	20%	18%	43%
	Technical Manager	33%	35%	6%	34%
	Manager	42%	31%	22%	15%
SOCIAL WORK	Direct Service	45%	29%	15%	27%
	Administrator	33%	44%	30%	40%

affective and behavioral competencies. Engineering jobs require strong capabilities in symbolic and perceptual areas while direct service social work emphasizes affective and perceptual competencies.

Both professions seem to have problems of career adaptation although for different reasons. In social work it appears that many incumbents of jobs at all levels feel somewhat overwhelmed by the requirements of their jobs. The challenge for professional education would seem to lie in the development of more powerful "social technologies" and educational methods for responding to our country's increasing social problems.

The problem in engineering may more properly be considered one of professional deformation. The scientific technologies of the various engineering fields with their attendant scientific problem solving mentality have proven their potency repeatedly. Career adaptation problems in engineering stem more from over specialization in these learning competencies to the point where professionals in the field have difficulty in adapting to managerial job roles that require greater affective and behavioral competence.

C. Learning Style Adaptation in Professional Careers

Jan Gypen

The present study attempts to build and test elements of an experiential learning theory of career development. Inspired by a Jungian view of adult development, the theory posits that through professional training, individuals specialize in one or a few learning modes, while other modes remain nondominant or dormant. Then, as these individuals move through their careers and encounter situations that demand considerably more of them than their specialist skills, nondominant learning modes are likely to be developed.

This view will be contrasted to two other lines of reasoning, which underly several current theories of career development. Along a first line of reasoning, it can be argued that professionals stay very much put in their specialized skills. They may move into jobs that make considerable demands of their non-specialist skills, to which the individuals nevertheless react with the kind of learning skills they are good at, i.e., their specialized learning modes. This view, then, stresses the continuity of learning preferences throughout a person's career.

A contrasting argument can be made, stressing the changing nature of a person's learning preferences. For it can be argued that, as persons mature, the very process of aging may drive them to become better integrated persons, and by implication, to develop their nondominant learning modes in addition to their specialist learning skills.

The present, experiential learning theory of career development shares with the latter view an emphasis on the changing nature of a person's learning preferences. It does not, however, look upon aging as the factor which triggers the emergence of nondominant learning modes. Instead it views these changes as being accompanied by changing demands, or learning presses, in the job environment. As individuals move through their careers they may or may not be faced with learning demands that press for their nondominant learning preferences to emerge.

For instance, as professionals leave jobs which are tailored to their specialist skills, they may move into management or administrative jobs. These jobs typically require broader learning skills than the ones the professionals have been trained for. To the extent that these jobs demand versatility in nonspecialist learning skills, they count on the development of nondominant learning modes. Conversely, professionals who stay in jobs that mainly appeal to their specialist skills, are less likely to develop their nondominant learning modes.

This line of reasoning precludes a definitive statement on the direction of causality for the changes: The initial thrust for change can be both in the individual and in the environment. As an individual experiences changing learning preferences, he or she may search for an environment that fits these changes, and choose a new job or position accordingly. Yet it is equally possible that the individual is selected into a new job, and only then starts to change learning preferences as demanded by the job environment. The present theory excludes neither possibility. Indeed, it assumes that both are at work to some degree without violating its basic thrust.

When applied to learning orientations as they develop along career lines, the three views presented lead to quite different explanations and predictions. The present study will attempt to compare them empirically. The data of the present study are based on the interview sample of engineering and social work alumni.

In its speculations on development, experiential learning theory (Wolfe and Kolb, 1979) posits three broad stages: acquisition, specialization, and integration. During youth and adolescence, individuals acquire basic skills and abilities in each of the four learning modes--the stage of acquisition. However, nearly all of the experiential learning literature to date is focused on the next stage, specialization.

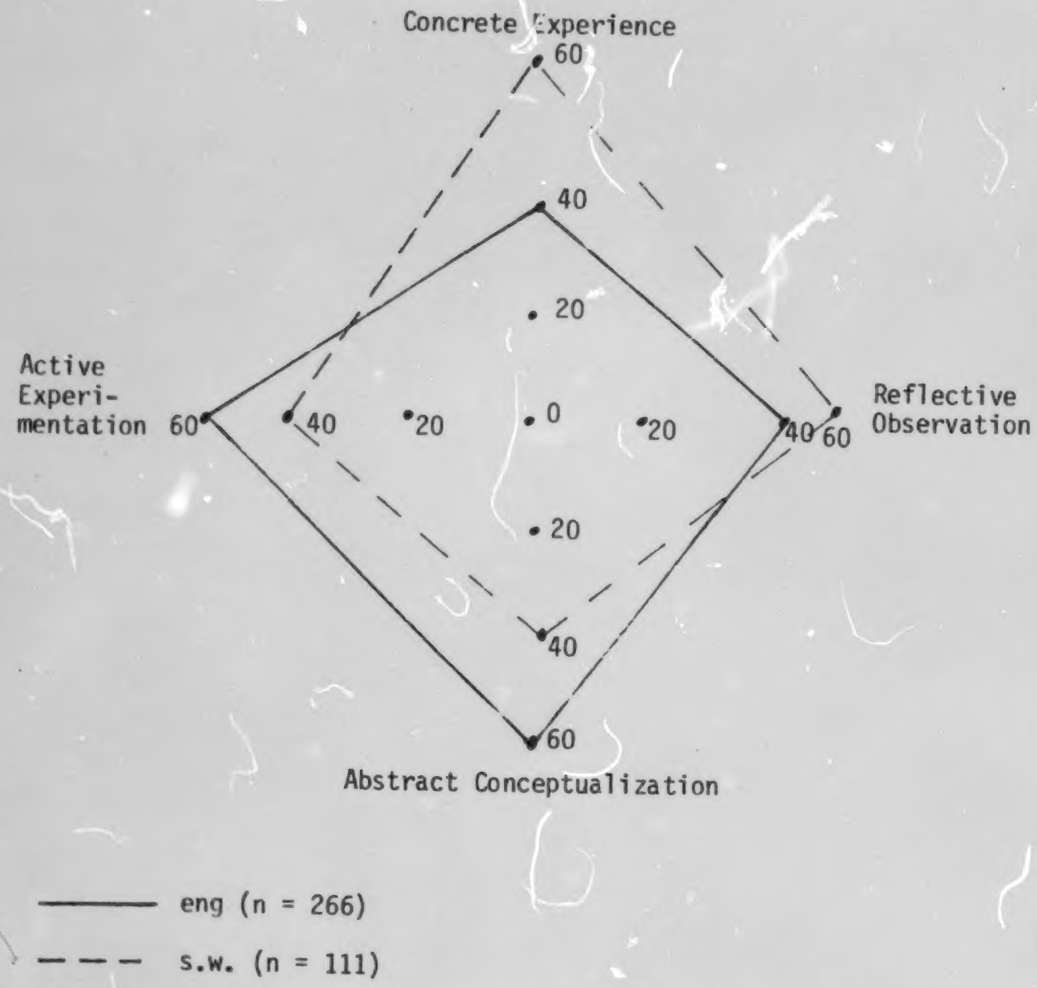
The stage of specialization runs from adolescence through early adulthood. As a result of the interplay between hereditary factors and socialization experiences in the family and at school, individuals have by then developed a characteristic pattern of dealing with the four learning modes. But especially during formal education or other career training, development follows paths that further accentuate one, or more, particular learning preferences.

As applied to engineering and social work schools, there is empirical evidence that the two academic fields differ substantially in the types of learning preferences they foster. In terms of Kolb's four part learning typology, they prove to be each other other's complement. This difference between engineering and social work is shown by the LSI scores of the alumni survey sample. Figure 6-6 plots the mean LSI scores for each group on the four learning modes. Alumni of the school for social workers reported higher preferences for concrete experience. Engineering graduates, conversely, scored significantly higher on abstract conceptualization and active experimentation than did social workers.

The overall learning profile of engineering graduates is consistent with the profiles of engineering students. For instance, the learning preferences of graduate students in electrical engineering at the University of Utah were obtained by Liapsis and Seybolt (1975). As evidenced in their scores on the Learning Style Inventory, these engineering students, too, prefer abstract and active learning over concrete and reflective learning.

This finding is consistent with an earlier analysis by Kolb (reported in Wolfe and Kolb, 1979) of the learning environment in engineering schools. Kolb reinterpreted data collected from faculty and graduates of over 100 academic institutions in the United States, including schools for engineers. From his analysis, Kolb concluded that engineering schools tend to stress abstract and active learning over the two other learning modes.

FIGURE 6-7: LEARNING STYLE INVENTORY PERCENTILE SCORES FOR ENGINEERING AND SOCIAL WORK GRADUATES



Other studies reviewed in Wolfe and Kolb (1979), report analogous differences in the learning preferences between graduates of several other academic fields, that are consistent with what has been found for students in their respective fields. This lends credence to the existence of professional identities to the extent that they are characterized by typical constellations of specialized learning skills, and fostered by rigorous training in these skills by their respective professional schools.

Besides overall data on learning specializations by profession, the question of what happens to the learning preferences of graduates as they move through their careers has remained largely unexplored. How stable do preferences remain after they were consolidated during professional training?

Perhaps graduates who remain in the professional jobs they are trained for, specialize further in the learning preferences they had accentuated during professional education. Or, conversely, as they move on to other jobs that even within the same professional field differ in their learning demands, professionals concurrently "adapt," and develop learning preferences that are complementary to the ones they had formerly accentuated.

While talking about the subject matter of the present study, a few respondents offered examples of engineers who had moved into management but remained basically engineers at heart. One respondent pointed to President Jimmy Carter who is widely criticized for not having outgrown his engineering background. Many other respondents, however, pointed out how impressed they often were to learn that executive officers of their corporations had started their careers as engineers. Few could trace typical engineering aspects in the current behavior of these officers: Their engineering background must have been complemented by other learning orientations, as demanded by a management environment.

In his writings on psychoanalysis, Jung (1923) brings up similar examples, both of one-sided and of "integrated" adults. Interestingly, Jung's theory has, just as Kolb's, four functional types (based on the prevalence of either thinking or feeling, sensing or intuiting), which, however, only partially match the content of Kolb's four learning types. Jung argues that individuals tend to specialize in one of the four functions throughout their early adulthood. All four functions are developed to some degree but only one dominates the "persona" or personality. The others remain relatively underdeveloped and repressed as "shadows" in the unconscious; they are nondominant.

Later in middle adulthood the nondominant functions can surface more fully, whereby the shadows start to be integrated in the persona. One of the functions of Jungian psychoanalysis is to aim at such an integration of all sides of one's personality. Aside from psychotherapy, Jung leaves open what significant occasions in life induce the surfacing of nondominant functions. He argues though that moving to and through middle adulthood, most normal individuals bring out their nondominant sides.

Partially inspired by Jung, the present study argues by analogy that during early adulthood a learning preference constitutes a dominant part of one's personality: One or two learning orientations are dominant, while the others are considered to be nondominant. Then moving to middle adulthood, nondominant learning orientations may surface.

After the life stages of acquisition and specialization, nondominant learning orientations are reasserted in the stage of integration. Means of adapting to the world that has been suppressed in favor of the more highly rewarded, dominant learning orientations, then find expression in the form of new career interests, changes in life styles, or creativity in one's career.

Kolb and Wolfe (1977) argue that in the stages of acquisition and especially specialization, progress along one of the four learning orientations can occur with relative independence from the others. A child and young adult, for example, can develop highly sophisticated proficiencies in abstract thought, yet remain somewhat naive emotionally.

At the integration stage, they theorize, development in one learning orientation also precipitates development in the others. As the sheer number as well as different kinds of experiences grow (Cherrington, et al., 1979), an individual is bound to store increasing information in memory and gains an expanding capacity for dealing with the complexity of this information in terms of all four learning modes. When faced with a particular learning task, the individual may initially rely on his or her preferred learning orientation, but the very act will also call up memories that highlight the other dimensions of the problem. Gaining an abstract understanding of a specific period in music history, for instance, will more likely flow over into an emotional enjoyment of that music, a refined sensitivity to the composing details, and stimulate a wish to listen to other period music. Such an adult, strong in abstract conceptualization, can hardly escape also refining and sharpening the orientations toward concrete experience, reflective observation, and active experimentation, thereby integrating all four learning orientations to some degree.

Many kinds of occasions and circumstances in one's life may trigger nondominant learning orientations to surface: significant experiences such as an accident, long sickness, death of a parent, birth or loss of a child, divorce, change of jobs, or moving to a new country or community. Since professionals--the subjects of the present study--are typically deeply invested in their work (considerably more so than blue collar workers, for instance; see Goldthorpe, et al., 1968 and Hughes, 1928), it is reasonable to explore whether and what type of significant changes in their work environments induce the surfacing of nondominant learning orientations during the integrative stage of adult development.

The only study to date on learning orientations during adult development was conducted at the University of Hawaii (Clarke, et al., 1977). The study compares a cross-sectional sample of marketing and accounting professionals along their career lines. Lower level marketing professionals were found to be high in abstract and active learning orientations, as measured by their scores on the Learning Style Inventory. These results reflect the highly technical emphasis in the early stages of a career in marketing. At the senior level, however, the marketing professionals reflected in their LSI scores a greater concern with client relations and general management. There they balance both the active and abstract orientations of their lower level colleagues and are somewhat biased towards concrete experience. These results suggest the hypothesis that, as professionals move along career lines, progression towards broader and polyvalent challenges calls for giving up exclusive preferences for specialized learning orientations, and integrating underdeveloped and nondominant orientations.

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As graduates of professional schools enter the world of work, they typically take on a first job that relies heavily and almost exclusively on what they have been trained for. Graduates of engineering schools typically take on a job at the "bench," where they have to apply advanced technology to the solution of practical problems such as the development and construction of physical structures, products, and technical processes. Social workers typically find themselves first in "direct service," where they must help clients in need with their social and emotional problems.

As these professionals rise up the career or occupational ladder, they may take on a higher position that includes added responsibilities besides the ones that constituted their first job. Typically, they find themselves in supervisory positions, as superiors of their peers. Bench engineers move up to be "section chief" or "senior engineer," supervising the work of other engineers or scientists.

Social workers may similarly move up from direct delivery to a supervisory position. Their new job may still involve direct service, e.g., for extraordinary cases but their primary responsibility is to direct the work of other social workers.

Professionals who then wish to rise even further must move further out of their primary field or specialty, and become generalists at the level of administration or management. Engineering graduates may still work for an organization whose service or product is highly technological, but as managers, e.g., project managers, they face new demands that their education had left them relatively unprepared for. At this level they must transcend the technological perspective and integrate it with issues such as marketing, finance, human resources, and business policy.

Similarly, social workers at the administrative level are likely to be excluded from any direct contact with "clients," but instead may be personnel director for an organization or executive of a social service agency. Here they must make decisions of wider scope, and often work towards the implementation of social policy in society rather than at the individual client level.

Previous research documents the significant and qualitative differences in the content of the jobs along the career lines mentioned. For engineering graduates, the differences between the jobs of bench engineer, supervisor, and manager are extensively discussed by Bayton and Chapman (1977). The authors specifically address the transition from specialist-engineer to manager, as reported by engineers in the National Aeronautics and Space Administration of the U.S. Government:

> The period of the greatest difficulty for an . . . engineer occurs during his first two jobs as a supervisor or manager. It is in these positions that he is first most clearly separated from his specialty, and required to meet management performance standards (p. 409).

In the transition from specialist to generalist, engineers must greatly expand and change their personal skills, learn the functions of management, and face a job environment with quite different patterns of motivation.

The transition from engineer through supervisor to manager is also evident in the specific learning skills required. This is documented by a study of 100 engineering graduates who were employed in a chemical and an electrical organization in the Midwest (Manring, 1980). Comparing the learning demands at the bench to those at management levels, the author concludes that management is inherently richer, in that it presses for the emergence of the orientations of concrete experience and also reflective orientation, which, for engineers, are typically nondominant orientations.

Social workers who move into administration similarly face quite different job environments. The differences are extensively documented in the work of Teare (1979). Teare, a specialist in task analysis for public welfare organizations, collected task descriptions from hundreds of social workers across the U.S., and subjected the data to cluster analysis. The clusters for social workers in direct practice are more specialized in scope, while those for social workers in administrative positions are wider and more general in nature, even more so than for social work supervisors.

When cast specifically in terms of learning demands, there is empirical evidence that direct service and administration indeed differ significantly in their requirements (see Section VI-B). In direct service, social workers report high demands in the area of concrete experience ("affective" on the graph) and reflective observation ("perceptual"). But administrative positions are perceived by their job holders as pressing for additional development in their typically nondominant areas of active experimentation and abstract conceptualization.

Central in the present experiential learning theory of career development is the thesis that, as engineering and social work graduates move through the career levels of technical specialist, supervisor, and manager, they increasingly bring out their nondominant sides because they face learning demands of a broader and more polyvalent scope. This argument applies earlier speculation by Wolfe and Kolb (1979), that, although learning styles are acquired in childhood and accentuated in adolescence and early adulthood, those orientations not engaged need not atrophy. Rather they remain dormant and ready to emerge in later phases of adulthood when kindled by the environment.

Engineering graduates who move into management are likely to spend much less time on the direct application of scientific knowledge. While there is a continuing concern for action, they must also focus on the concrete realities of managing people and planning for contingencies. They are also bound to show a reflective pose, to see the big lines of policy and strategy, and to perceive conflicts among priorities. The emergent need, then, is for increased competence in handling concrete experience and reflective observation--their nondominant orientations--in addition to their initial, dominant strengths in abstract conceptualization and active experimentation.

In contrast, social work graduates moving into administrative or policy formation assignments, must back away from the concrete details of individual cases, in order to gain a larger perspective; instead they must bring out their analytic skills. Neither is it necessary for them to "reflectively" understand the uniqueness of each client, but rather they must actively influence an organizational or even extra-organizational environment. Their emergent need, then, is for increased competence in handling active experimentation and abstract conceptualization--their nondominant learning orientations--in addittion to their initial, dominant strengths in concrete experience and reflective observation.

Interestingly enough, while engineers started out with learning strengths that were the very compliment of the strengths of social workers, those individuals of both groups who move up to the level of general management or administration, should end up with a similar mix of the four learning orientations in their jobs: strong in their initial dominant orientations, but with increasing competence in their nondominant ones.

Translating this argument into testable hypotheses, it is expected, then, that the further engineering and social work graduates rise on their career lines, the more they orient themselves to their previously nondominant learning modes, thus complementing their initially dominant, more limited specialist skills.

Hypothesis 1 and 2. Engineering graduates who currently hold management positions are expected in Hypothesis 1 to describe their learning orientations in their current jobs to be more highly developed along the dimensions of concrete and reflective learning than in their initial jobs at the bench, where these engineers were specialized in abstract and active learning.

In addition, Hypothesis 2 expects similar differences to be reported by senior engineers, although of a lesser magnitude.

As a corollary to Hypotheses 1 and 2, engineers who are still at the bench, should report no significant changes in any of the four learning orientations.

Hypothesis 3 and 4. Conversely, in Hypothesis 3 social workers who hold administrative positions are expected to describe their current learning orientations as more highly developed along the dimensions of active and abstract learning than in their initial jobs in direct service, where these social workers were specialized in concrete and reflective learning.

In addition, Hypothesis 4 expects social work supervisors to report similar differences to be reported by senior engineers, although of a lesser magnitude.

Finally, as a corollary to Hypotheses 3 and 4, social workers who are still in direct service are expected to report no significant changes in any of the four learning orientations.

As engineering and social work graduates proceed along their respective career lines--from specialist, through supervisor, to generalist--both groups increasingly face learning demands that thereto had not been their respective strengths. However, in contrast to the argument in the previous section it can also be reasoned that these changing environmental demands need not coincide with similar changes in the learning orientations of the occupants. This section explores two alternate lines of reasoning.

First, it can be argued that learning styles are, like traits, pretty well established, if not after childhood then certainly after being consolidated during professional training and at the first job in the profession. Learning specialization, then, is not subject to appreciable change, even in the face of a job environment that presses for learning skills the individual had left relatively undeveloped. Indeed, some evidence for this view is seen in the previous section where we see significant differences in the respective learning presses for technical jobs, supervisors, and managers, yet fail to find similar differences in the personal learning styles as measured by the Learning Style Inventory between engineering graduates at the three career levels.

This view of fixed specialization lies behind most of the literature on career choice. The whole movement of vocational testing arose from differential psychology and trait factor theories. As summarized by Hewer (1963), the basic proposition of trait and factor theories is that individuals differ in their traits, and jobs differ in their requirements. On the basis of tests, vocational counselors try to match individuals and jobs; the matching thus solves the problem of occupational choice. More importantly, it is generally assumed that the process of occupational choice is coming to a permanent closure when an individual begins to work in his or her early or middle 20's.

Just as much of vocational psychology tries to establish personality traits in specialized occupations, much of the empirical research to date on experiential learning--in paradoxical incongruence with its speculations on integration--searches for unique constellations of learning modes in different occupations (reviewed in Wolfe and Kolb, 1979). Both have in common the apparent assumption that, after certain maturation points have been reached, an individual makes a commitment to a profession whereafter development is considerably restricted and will not change appreciably.

Also a prominent theorist in the burgeoning field of career development, Ed Schein (1979), appaears to lean toward a trait view. Central in his writings on career dynamics is the notion of career anchors. Primarily during training and the early career, an employee develops a clear occupational self concept or anchor.

As the very word anchor implies, the concept is intended to identify areas of stability in a person. Although Schein acknowledges that an anchor might change over a lifetime, it is explicitly designed to explain the sources of continuity. Indeed, reviewing career-anchor research, Schein hypothesizes that career anchors, i.e., talents, abilities, and by implication, basic learning preferences remain stable throughout a person's career. Thus Schein puts heavy emphasis, as do the theorists of career choice, upon selection procedures to find as close a match as possible between job demands and relatively stable characteristics of the person. This view of adult development can be backed up by a number of personality theories, not in the least the Freudian one. For Freudian theoriests of career development (Roe and Siegelman, 1964; Bordin, Nachman and Segal, 1963; Weinstein, 1953), major career transitions such as selecting an occupation, entering a profession, and changing jobs, merely rekindle deeply ingrained, psychodynamic conflicts, and reactivate and deepen well established coping and learning styles. Since this view challenges the previously offered hypotheses, a counter hypothesis can be stated.

Hypothesis 5. The learning orientations of engineering and social work graduates at their current jobs are not significantly different from their orientations at their first jobs regardless of the learning demands at their current jobs.

Given significant alterations in learning presses along the career lines of engineers and social workers, as they move into administrative positions another line of reasoning can be developed which predicts that as professionals grow older they tend to develop their nondominant learning orientations as part of the process of maturing. While acknowledging that occupants of management positions tend to be appointed at a more advanced age, a maturation view would argue that the emergence of nondominant learning orientations is not so much due to the new and different presses in the job environment, but is to be expected anyway because of the maturation process that brings out these orientations in the lives of most individuals.

This view comes close to the Jungian interpretation, as described earlier. As a matter of fact, Jung expects nondominant functions of the personality to "ripen," sometimes precipitated by dramatic experiences in the course of life; but he appears to almost exclude these to happen in the context of work. Jung relegates work to the more constricting aspects of existence and views it indeed as inhibiting the development of an integrated personality (Jung, 1971). Rather ". . . the basic cause of (the) transition is to be found in a deep seated and peculiar change within the psyche" (p. 14).

Several recent theories of career development similarly focus on gradual, psychological changes along stages that most adults must go through in the course of their careers, resembling curves of biological growth. Hall and Nougaim (1968) studied AT&T managers and found evidence to support the concept of five stages, along which new needs gradually appear. Dalton, Thompson and Price (1977) studied the careers of several hundred engineers in seven large organizations, and came up with their own model of four stages in professional careers: apprentice, colleague, mentor, and finally, sponsor which appear to imply the gradual emergence, in Jungian terms, of dormant functions into a more integrated personality.

Dalton, et al., are quite explicit in stating that it is not so much the learning demands of a specific job environment--such as for a technical or a senior engineer, or a manager--that determine the respective learning tasks of career stages, but rather the kind of psychological adjustments that go along with the process of aging in a career.

The maturity argument that nondominant learning orientations will gradually emerge along with age is not easy to translate into a testable hypothesis. For none of the authors mentioned agree with each other on any of specific ages that delineate one stage from another. Second, each of them remains quite imprecise in putting an exact age to each "hinge" year; phrases like "around 30" or "between 30 and 35" abound. Thereby they virtually preclude the testing with step wise functions.

Yet to the degree that these authors also rely on the "gradual" maturation over the years, that part of their argument can be tested with linear functions. So two testable hypotheses can be built, which again compete with the previous hypotheses.

Hypotheses 6 and 7. A strong connection is expected between increasing age and increasing attention to initially nondominant learning orientations--for engineering graduates, concrete experience and reflective observation; for social work graduates, abstract conceptualization and active experimentation--regardless of learning demands in their current jobs.

In contrast to the two previous views, the experiential learning view of career development, then, can be reformulated as one of adaptation. Such a view stresses the interaction between learning orientations in the person and learning demands in the job environment. Akin to a Lewinian model of personality, it defines learning as a mediating process between organism and environment. There is organization within the organism and organization within the environment; at the cross-organization of the two, learning takes place.

In contrast to the trait view which focuses on early career choice and permanent closure, such a choice process can be seen as co-extensive with a person's working life where choices may be reopened at any time. (Interestingly enough, one of the earlier, Freudian students of careers, Eli Ginzberg, converted himself to this point of view after 20 years of research as is described [illegible] restatement of his theory in 1972.)

Next, in contrast to the maturity view of careers which stresses aging as a primary driving force towards integration, the experiential learning view of career development focuses on the interaction between individuals and their specific job environments.

Experiential learning theory of career development follows an adaptation view that is close to the view held by one of the pioneers of career development, Super (1957, 1977). Super argues that career development cannot be understood unless it focuses on both the changing personality and interactions with the environment.

The central construct in Super's theory is the self concept which keeps on emerging through interaction with the environment and through socialization. The individual faces demands from the environment which are then used to modify the self concept. As the individual implements the modified self concept, this learning is translated into action which, in turn, provides additional feedback for further modifications.

A similar theme of environmental facilitation and personal change is central in a study of the careers of 30 alumni of the School of Industrial Administration at Carnegie Tech (Dill, et al., 1962). The researchers' premise is that it is more fruitful to examine the immediate interaction between person and environment, than to look for long range relationships. The latter, they argue, is near to impossible because personal characteristics cannot be assumed to be permanent, and because the environment through the nature of its demands and constant feedback, is of crucial importance. This view of adaptation can be generalized in a hypothesis which differentiates it from the trait and the maturity view.

Hypothesis 8. The learning demands of current jobs should explain more of the current learning orientations of engineering and social work graduates than would either the learning orientations they had at their first jobs or their ages.

Method of Data Collection. This study used data collected from the alumni interview sample described in Section III-A. Since several hypotheses relate to occupational levels, it was necessary to categorize both first and current jobs of the interviewees. Based on information from the preliminary survey and the interview protocols, one researcher and the present author independently classified each interviewee's first and current job into one of eight categories (four for engineering graduates, and four for social work graduates) following the rationale on career movement as outlined in the theory chapter. The coding by the two researchers was in almost total agreement; differences were resolved by consensus. (The results for engineering and social work graduates are listed in Tables 6-6 and 6-7 respectively.)

Substantiating the earlier discussion on career lines, almost all (82 per cent) engineering graduates interviewed had started their careers "at the bench." Of the 36, 13 had risen to senior engineer at the time of the interview and 12 to a management level. At the time of the interview 11 were still at the bench: 5 had been at this level for 8 to 23 years, and another 6 for at least 3 years; all had moved at least once to another organization or department.

Similarly, almost all social work graduates interviewed (86 per cent) had started their careers in "direct service." Of the 19, 8 had become supervisors of other social workers at the time of the interview, and 5 had moved into an administrative position. All interviewees had moved to at least one other organization after graduation.

The Adaptive-Competency Scale, an instrument for the first time used in the present research was constructed to improve on Kolb's Learning Style Inventory (see Appendix B). The Adaptive-Competency Scale attempts to aim at improving the Learning Style Inventory in four ways: (1) to help the subject more directly in understanding each of the four learning orientations by the use of a descriptive paragraph instead of just six words; (2) to eliminate the forced ranking characteristic of the LSI; (3) to provide the subject with rela-

TABLE 6-6: FIRST AND CURRENT JOBS OF INTERVIEWED ENGINEERING GRADUATES (n = 44)

	Graduation Year					
First Job	1975	1970	1965	1960	1955	Total
Bench Engineer	6	3	11	8	8	36
Management	0	1	0	1	0	2
Other	1	2	0	1	2	6
Total	7	6	11	10	10	44
Current Job						
Bench Engineer	6	1	2	1	1	11
Senior Engineer	0	3	4	5	2	14
Management	0	1	5	4	6	16
Other	1	1	0	0	1	3
Total	7	6	11	10	10	44

Notes: The category "Other" includes law, army, foreman, and graduate assistant.

All interviewees had moved to at least one other organization or department.

TABLE 6-7: FIRST AND CURRENT JOBS OF INTERVIEWED SOCIAL WORK GRADUATES (n = 22)

First Job	1975	1970	1965	1960	1955	Total
Direct Service	7	4	3	3	2	19
Administration	0	1	0	0	2	3
Total	7	5	3	3	4	22
Current Job						
Direct Service	3	0	1	0	0	4
Supervisor, S.W.	3	3	2	0	0	8
Administration	1	1	0	3	2	7
Academia	0	1	0	0	2	3
Total	7	5	3	3	4	22

Note: All interviewees had moved to at least one other organization since their first jobs.

tively fixed, situational referents on which to project learning orientations; and (4) to use a rank ordered scale for measuring learning demands or presses in situations which is commensurate to the scale used for measuring personal learning orientations.

The ACS describes each learning orientation in a full paragraph:

> An orientation toward CONCRETE EXPERIENCE focuses on being involved in experiencing and dealing with immediate human situations in a personal way. It emphasizes feeling as opposed to thinking; a concern with the uniqueness and complexity of present reality as opposed to theories and generalizations; an intuitive, "artistic" approach as opposed to the systematic, scientific approach to problems. People with concrete-experience orientation enjoy and are good at relating to others. They are often good intuitive decision makers and function well in unstructured situations. The person with this orientation values relating to people, being involved in real situations and an open minded approach to life.
>
> An orientation toward REFLECTIVE OBSERVATION focuses on understanding the meaning of ideas and situations by carefully observing and impartially describing them. It emphasizes understanding as opposed to practical application; a concern with what is true or how things happen as opposed to what will work; an emphasis on reflection as opposed to action. People with a reflective orientation enjoy and are good at sensing the meaning of situations and ideas and at pondering their implications. They are good at looking at things from different perspectives and at appreciating different points of view. They like to rely on their own thought and feelings to form opinions. People with this orientation value patience, impartiality, and considered, thoughtful judgment.
>
> An orientation toward ABSTRACT CONCEPTUALIZATION focuses on using logic, ideas and concepts. It emphasizes thinking as opposed to feeling; a concern with building general theories, as opposed to intuitively understanding unique, specific areas; a scientific as opposed to an artistic approach to problems. A person with an abstract conceptual orientation enjoys and is good at systematic planning, manipulation of abstract symbols, and quantitative analysis. People with this orientation value precision, the rigor and discipline of analyzing ideas and the aesthetic quality of a neat, conceptual system.
>
> An orientation toward ACTIVE EXPERIMENTATION focuses on actively influencing people and changing situations. It emphasizes practical applications as opposed to reflective understanding; a pragmatic concern with what works, as opposed to what is absolute truth; an emphasis on doing as opposed to observing. People with an active-experimentation orientation enjoy and are good at getting things accomplished. They are willing to take some risk in order to achieve their objectives. They also value having an impact and influence on the environment around them and like to see results.

As a solution to the forced ranking of learning modes, the ACS asks the subjects to rate each of the four learning orientations separately, without conditioning the score of one orientation to that of any other. The rating scale follows a Likert-scale format and has seven ordered points. Each point has a sentence attached which describes a behavior or an attitude that is increasingly more favorable to the particular learning mode.

1 = I avoid this orientation.

2 = I am unconcerned with this orientation.

3 = I respond this way if I have to.

4 = I sometimes choose to be this way.

5 = I work at developing this orientation.

6 = I prefer to deal with situations this way.

7 = I organize my life around this orientation.

The ACS aims to make the LSI more specific by presenting the subject with a situational referent on which to project the learning orientations. A frequent comment about the LSI is that it asks about learning in a very general way. Some subjects for whom their family life is most up front in their minds at the time they fill out the inventory, consequently fill out the instrument with that very frame of reference. Others who fill out the LSI in a work or university setting may project learning against that specific environment. Since the experiential learning theory recognizes that a person does not necessarily rely on the same specific learning orientations across situations, it is prudent--for comparison's sake--to offer the subjects one or more specific role environments on which to project their learning orientations.

The ACS uses three situational references. For each learning orientation it asks: "To what extent were you oriented this way: (1) during your professional education? (2) at your first job after your professional education? and (3) at your current job?" For each referent, the subject is asked to rate him or herself on the seven point scale.

Two of the three referents address the past, asking the subject to recall his or her orientations as they were several years ago. For younger graduates this involves thinking back for just a few years; for others, several decades.

This recall aspect of the instrument is intended to overcome two, methodological limitations of earlier, cross sectional studies which used the LSI (Clarke, et al., 1977; Sims, 1980), and collected data, grouped according to age, of a cross section of their populations at one particular moment. Cross sectional analyses bear the risk of making two mistakes: the life course fallacy and the fallacy of period centrism (Hagenaars and Cobben, 1978; Schaie, 1965).

The first fallacy consists in interpreting the differences between age groups at a certain moment as purely the result of growing older or of other age related concepts, such as career. Such an interpretation precludes the possibility that the older groups, when they were younger, may not have had the characteristics of the current, younger subjects. The second fallacy, of period centrism, refers to the risk involved if implicitly or explicitly the results of an analysis at one particular moment are generalized to other periods. For instance, alumni cohorts of the same school might have undergone drastically different curricula; and typical career paths of an occupation might change drastically over time.

One methodology to overcome these fallacies is the longitudinal method which studies a collection of people or cohort over their course of life. Besides being very expensive and time consuming--a century at the extreme--it also leads to its peculiar methodological difficulties such as subjects becoming unduly sensitive to the research questions in their behavior, dying or unwilling to commit themselves to further participation, not to speak of the problems of continuity on the researcher's end.

The present method aims at approximating a longitudinal view by asking participants to recall several periods of their adult life. This self reporting, retrospective-method is much more expedient and inexpensive to implement but is subject to its own fallacies such as loss or inaccuracies of recall and a possible tendency for subjects to either see their past in much the same way as the present, a halo effect, or to exaggerate differences of the past with the present, a contrast effect.

Either possibility could be checked by relying on commensurate, objective measurements. Given the lack of these in the present study, though, it is assumed that, to the degree that the past exerts a psychological influence in the present, the subjects' self perceptions and recalls, however subjective, are what count more.

Finally, the ACS attempted to construct a scale to measure learning demands or presses in the environment that is commensurate with the scale used for personal learning orientations making the two scales directly comparable.

Consequently, the whole instrument was doubled. Besides asking the subject to rate him or herself in three specific environments, the instrument also inquired about their perceptions of the learning demands or presses in each of these environments. For each of the learning orientations, the question is asked: "To what extent did the environment (named) below facilitate the expression of this orientation?"

The rating scale used for each of the three environments contains seven points. The words associated with each rating point are intended to match as closely as possible those used in the earlier scale for personal orientations:

1 = It inhibited this orientation.

2 = It was unconcerned with this orientation.

3 = It tolerated this orientation.

4 = It supported the expression of this orientation.

5 = It stimulated the expression of this orientation.

6 = It encouraged the expression of this orientation.

7 = It actively promoted this orientation.

Validity of the instrument. Although the Adaptive-Competency Scales is an instrument designed to differ from the LSI, it nevertheless is aimed at measuring the same four learning orientations. This was checked by comparing the four LSI scores with the four scales of the ACS that measure the subjects as they rate their personal learning orientations at their current jobs. Both sides of the comparison are thus centered on the person not the environment, and more or less on the same time frame, the present. Yet it must be remembered that the subjects took the LSI in April, 1978 and the ACS almost half a year later. As can be gathered from Table 6-8, each of the four ACS orientations does correlate significantly and positively with the corresponding LSI mode. In addition, three of the ACS scales correlate each significantly and negatively with their opposite on the LSI scale, bearing out Kolb's argument about the relationships between the four LSI modes.

As in many studies in career development, the present one also relies on retrospective data. As Osipow (1973) reviews the field he points at this methodological weakness. Longitudinal studies where no recall is involved overcome this particular weakness although, as stated earlier, they also create disadvantages of their own.

As one checks on the accurateness of their recall, the author compared the engineering graduates of 1955 and 1960 who had started their careers at the bench, with the recent graduates of 1975 and 1970 who are currently working at the bench. It can be argued that the characteristics which the earlier graduates recall of their first jobs should be similar to the characteristic as described by those who are in these jobs now and need not recall. The argument can be repeated for social workers in direct service.

The results are quite supportive. The two groups of social workers, earlier and more recent graduates, show no significant differences when describing learning presses of jobs in direct service. (Four one-way analyses of variance, one for each of the four learning presses yield F ratios with df = 1/6 and $p > .10$.)

Similarly, the jobs of engineers at the bench are described with little or no significant differences in presses between what recent graduates report and what earlier graduates recall. (Three one-way analyses of variance yield F ratios with df = 1/19 and $p > .15$; only for Reflective Observation is $F = 3.5$, with $p = .08$.)

It should be added that for at least one hour before filling out the ACS, all participants discussed their careers quite extensively during the preceding interview and thus had ample time to refine their recollections.

TABLE 6-8: PEARSON'S CORRELATION COEFFICIENTS BETWEEN THE LEARNING STYLE INVENTORY MODES AND FOUR ORIENTATIONS OF THE ADAPTIVE-COMPETENCY SCALES (n = 58)

	Personal Orientations at Current Job (ACS)			
LSI Modes	Concrete Experience	Reflective Observation	Abstract Conceptualization	Active Experimentation
Concrete Experience	.49 p < .001	-.17 n.s.	-.37 p < .01	.08 n.s.
Reflective Observation	.03 n.s.	.22 p < .05	.12 n.s.	-.34 p < .01
Abstract Conceptualization	-.30 p < .05	-.04 n.s.	.27 p < .05	-.09 n.s.
Active Experimentation	.01 n.s.	-.09 n.s.	-.06 n.s.	.37 p < .01

For Hypotheses 1 through 4, "learning orientations in current jobs" will be taken from the answers to the four questions on the Adaptive-Competency Scales, "To what extent are you oriented this way--in your current job?" which each follow a paragraph explaining one of the four learning orientations.

The parallel variables, "learning orientations in their initial jobs," are taken from the question, "To what extent were you oriented this way--at your first job after graduation?" which is repeated four times for each learning orientation.

For each group of job occupants (specialist, supervisor, or manager, as operationalized earlier in this chapter), a t-test between the two respective questions should establish whether the means of the two variables differ significantly and in the predicted direction.

Hypotheses 5 through 8 involve the whole of each sample, i.e., only by school, and not divided by job levels. The variable age is taken from the survey questionnaire, and the variables "learning demands at their current jobs" are operationalized from the ACS question, "To what extent did the environment facilitate the expression of this orientation--at your first job after graduation?" which is repeated four times for each learning orientation.

The latter hypotheses all have one variable in common, "learning orientations at their current jobs." Yet each hypothesis contains a particular predictive variable which is mutually exclusive with the predictive variables in the competing hypotheses. Thus a statistical method which has mutual controls built in, is called for. Eight regression analyses, one for each learning mode and repeated for each profession, are therefore appropriate.

By entering "learning orientations at their first jobs" (for the trait view in Hypothesis 5), age (for the maturity view in Hypotheses 6 and 7), and "learning demands in their current jobs" (for the adaptation view in Hypothesis 8) as three independent variables, the magnitude (and significance) of the three resulting standardized regression coefficients will indicate the comparative strength of each hypothesis in explaining the common, dependent variable.

Results. This section presents the results of the statistical analysis. First, the changes in learning orientations as engineers and social workers move up the career levels will be looked at in the order of Hypotheses 1 through 4. Next, the more general and competing Hypotheses 5 through 8 will be tested which deal respectively with a trait view, a maturity view, and an adaptation view of career development.

As argued in Hypothesis 1 through 4, whether one's job is at the managerial or administrative level, at the supervisory or at the technical level, should make for a difference in the kind of learning demands posed on the individual. Since the learning demands of particularly a management or administrative position count on all four of the learning orientations, they are likely to bring out the non-specialized or nondominant learning orientations which then complement the specialized learning skills of the professionals. Since the nondominant orientations of engineering and social work graduates were shown to be quite different, the ensuing analysis looks at the changes in personal orientations at the three career levels for each profession separately. (This leads, especially for social workers, to some small cells; yet the statistic used, the t-test, is especially designed for small samples.)

Engineering graduates who held management positions at the time of the interview, report a strong and highly significant progression towards concrete experience as compared to their initial job at the bench. (Results are listed in Table 6-9 and portrayed in Figure 6-7.) Similarly, when asked about their orientation towards reflective observation, the managers on the average again report a significant and positive change.

Concrete experience and reflective observation were earlier argued to be nondominant for engineers at the bench, but demands for them in a management position do help to bring them out as supported here. In addition the results show that the managers with an engineering degree report a significant and positive orientation towards active experimentation. Apparently a management position requires a further strengthening of this orientation in which engineering graduates tend to specialize anyway.

As do the managers, senior engineers report a highly significant, but somewhat smaller, increase in their orientations towards concrete experience. (See Table 6-10 and Figure 6-8.) Similarly they gain on reflective orientation but their increase is less significant than the managers. (The T-ratio is smaller and significant only at the .10 level.) As predicted in Hypothesis 2, the senior engineers follow the managers in reporting a significant, but smaller, increase in their nondominant learning orientations. In addition, they also report a small increase in their orientations toward active experimentation.

As predicted in the corollary to Hypotheses 1 and 2, engineers at the bench report no significant changes in any of their learning orientations. (See Table 6-11 and Figure 6-9.) They remain specialized in what engineers are trained for.

Social work alumni who held administrative positions at the time of the interview report significant gains on the two learning orientations that for their profession, can be considered to be typically nondominant. (Results are listed in Table 6-12 and portrayed in Figure 6-10.) The more impressive gain is in their increased reliance on active experimentation at their current jobs as compared to their first jobs. But also abstract conceptualization gets stronger. Both results fail to reject Hypothesis 3 (see Note 1).

In the line of Hypothesis 4, social work supervisors report similar changes as their colleagues at the management level, but to a lesser extent. First, there is a significant strengthening of only one orientation, active experimentation. (See Table 6-13 and Figure 6-11.) They also report some gain on abstract conceptualization but it fails to reach significance.

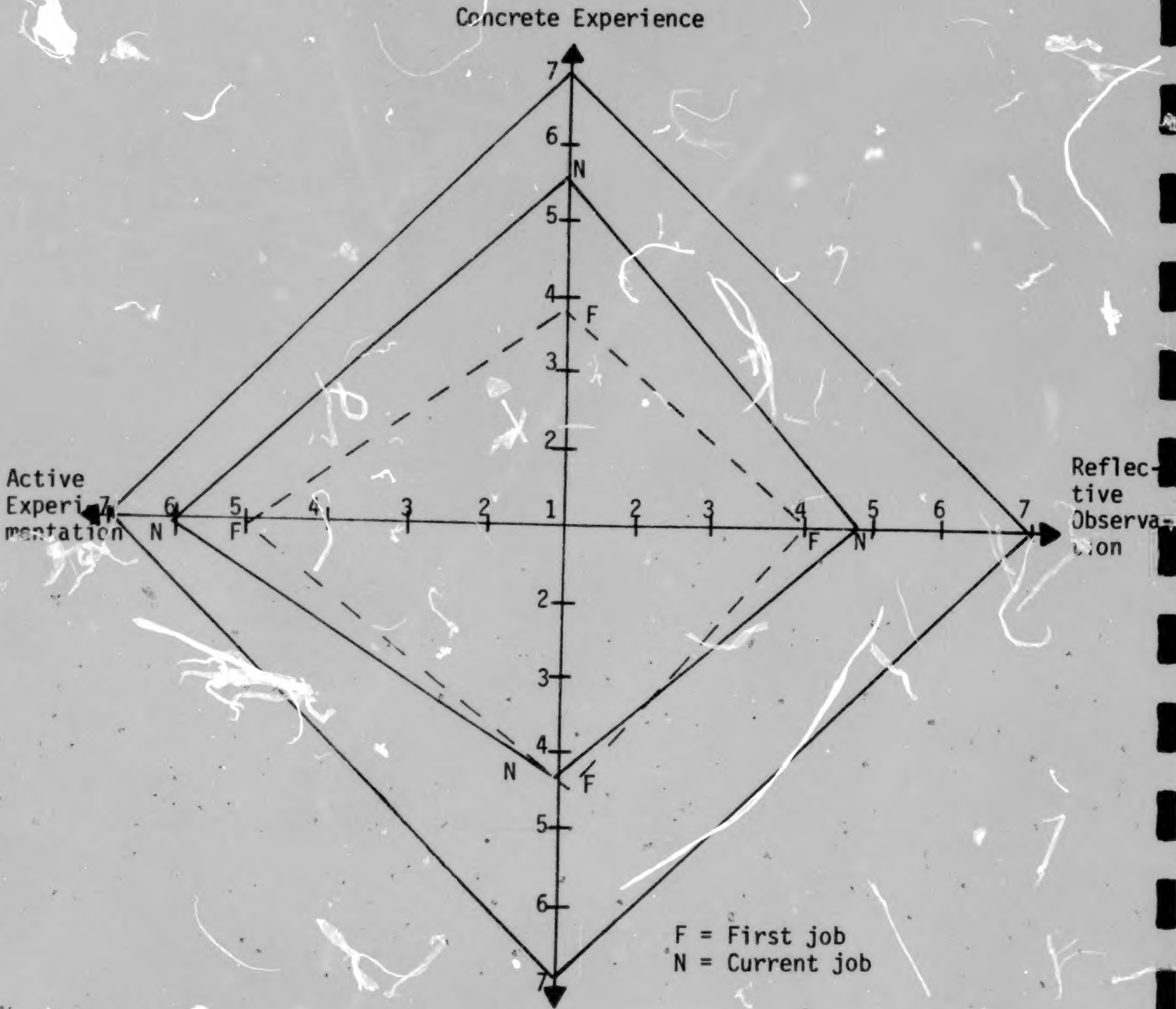
TABLE 6-9: LEARNING ORIENTATIONS FOR MANAGERS WITH ENGINEERING DEGREE (n = 16)

	Concrete Experience		Reflective Observation	
	Mean	SD	Mean	SD
First Job (1)	3.9	1.0	4.1	1.2
Current Job (2)	5.5	1.0	4.7	1.4
One-tailed t-test	T	p <	T	p <
(1) with (2)	5.2	.001	1.7	.05

	Abstract Conceptualization		Active Experimentation	
	Mean	SD	Mean	SD
First Job (1)	4.8	1.2	5.0	1.4
Current Job (2)	4.7	1.1	6.0	1.8
One-tailed t-test	T	p <	[illegible]	p <
(1) with (2)	-.1	n.s.	3.5	.001

SD	Standard Deviaiton
n.s.	Nonsignificant at the .10 level

FIGURE 6-8: GROWTH IN LEARNING ORIENTATIONS BETWEEN FIRST AND CURRENT JOBS FOR MANAGERS WITH ENGINEERING DEGREE (n = 16)



Legend: For "Self": (1) I avoided this orientation; (2) was unconcerned; (3) responded to; (4) sometimes chose; (5) worked at; (6) preferred; (7) organized my life around.

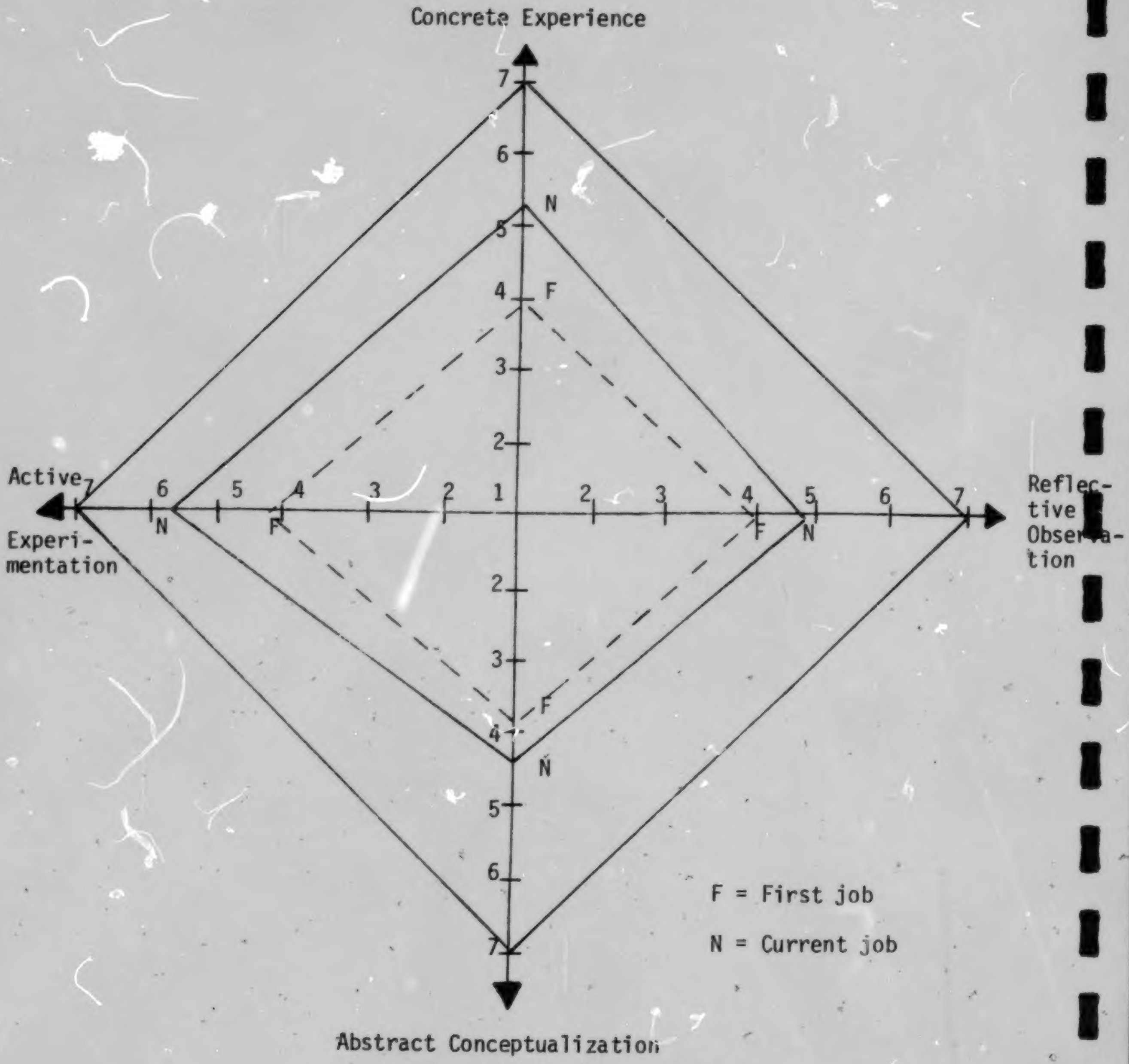
TABLE 6-10: LEARNING ORIENTATIONS OF SENIOR ENGINEERS
(n = 14)

	Concrete Experience		Reflective Observation	
	Mean	SD	Mean	SD
First Job (1)	3.9	1.1	4.2	1.3
Current Job (2)	5.2	1.1	5.0	1.2
One-tailed t-test	T	p <	T	p <
(1) with (2)	5.3	.001	1.6	.10

	Abstract Conceptualization		Active Experimentation	
	Mean	SD	Mean	SD
First Job (1)	4.1	1.2	4.4	1.2
Current Job (2)	4.4	1.2	5.6	1.2
One-tailed t-test	T	p <	T	p <
(1) with (2)	.7	n.s.	3.1	.01

SD	Standard Deviation
n.s.	Nonsignificant at the .10 level

FIGURE 6-9: GROWTH IN LEARNING ORIENTATIONS BETWEEN FIRST AND CURRENT JOBS FOR SENIOR ENGINEERS (n = 14)



Legend: For "self": (1) I avoided this orientation; (2) was unconcerned; (3) responded to; (4) sometimes chose; (5) worked at; (6) preferred; (7) organized my life around.

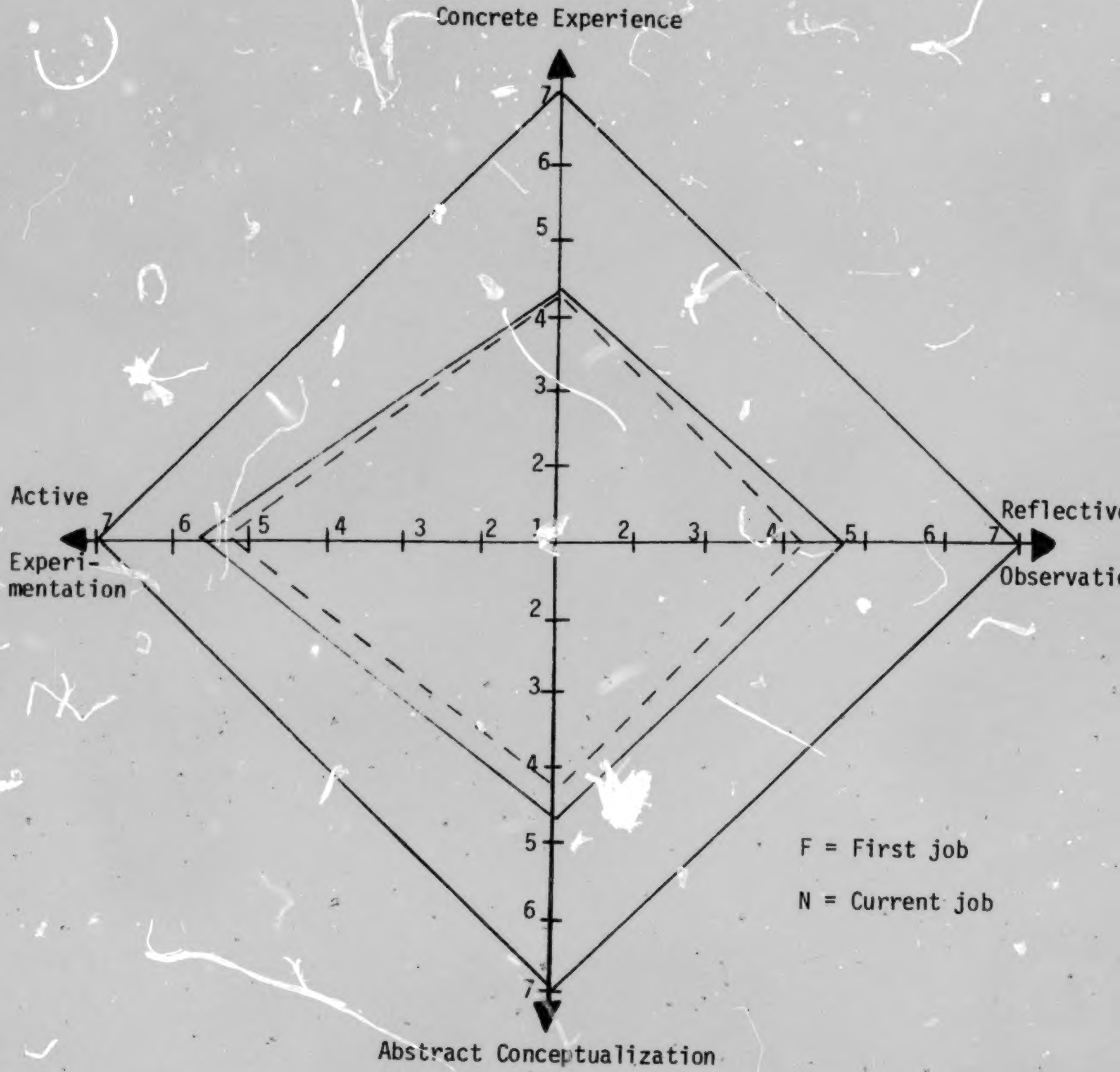
TABLE 6-11: LEARNING ORIENTATIONS OF ENGINEERS AT THE BENCH (n = 9)

	Concrete Experience		Reflective Observation	
	Mean	SD	Mean	SD
First Job (1)	4.3	1.2	4.1	1.1
Current Job (2)	4.3	1.6	4.7	1.6
One-tailed t-test	T	p <	T	p <
(1) with (2)	.0	n.s.	.9	n.s.

	Abstract Conceptualization		Active Experimentation	
	Mean	SD	Mean	SD
First Job (1)	4.3	1.4	5.3	.9
Current Job (2)	4.9	1.3	5.7	.8
One-tailed t-test	T	p <	T	p <
(1) with (2)	1.3	n.s.	.8	n.s.

SD	Standard Deviation
n.s.	Nonsignificant at the .10 level

FIGURE 6-10: GROWTH IN LEARNING ORIENTATIONS BETWEEN FIRST AND CURRENT JOBS FOR TECHNICAL ENGINEERS (n = 9)



Legend: For "Self": (1) I avoided this orientation; (2) was unconcerned; (3) responded to; (4) sometimes chose; (5) worked at; (6) preferred; (7) organized my life around

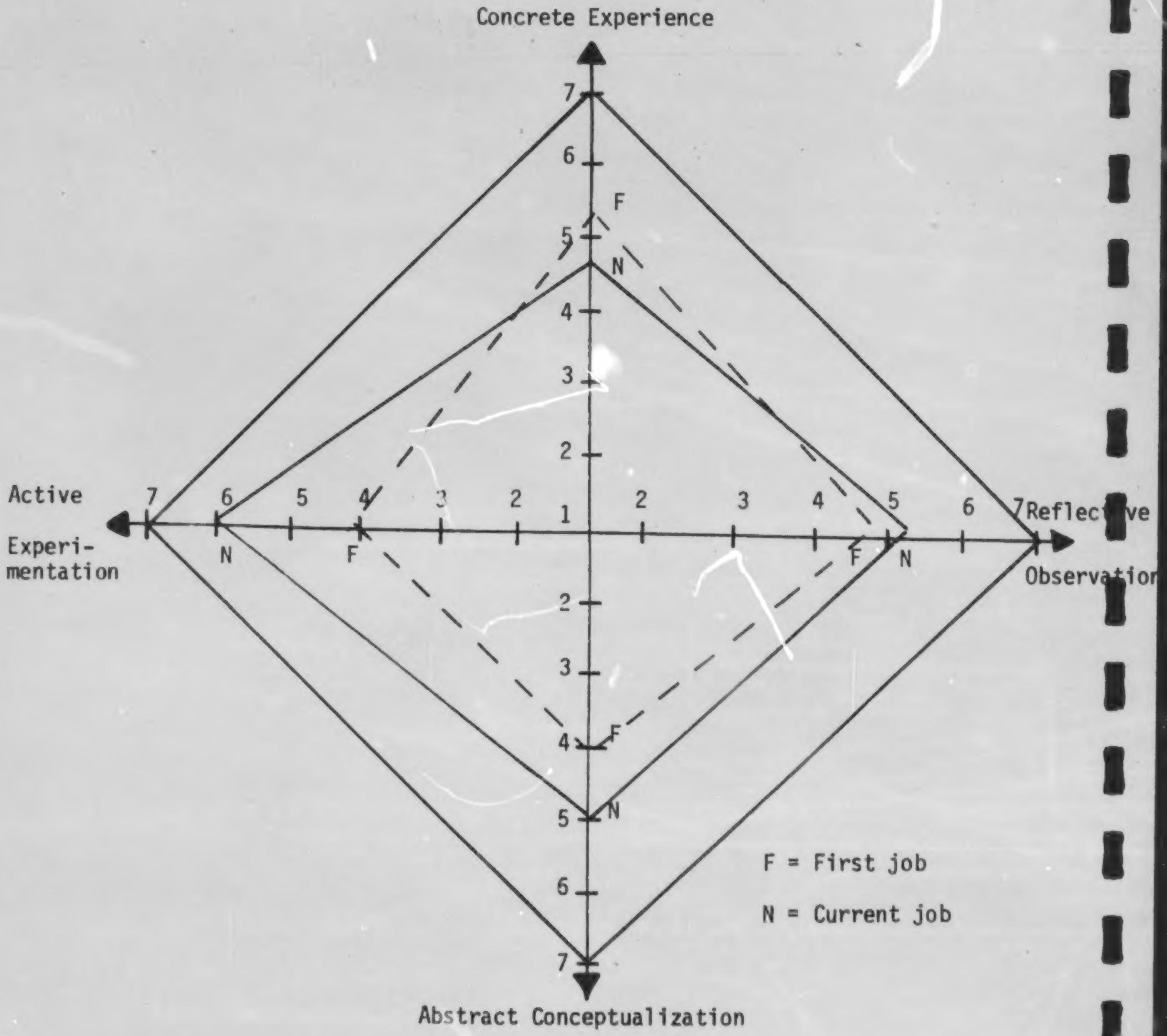
TABLE 6-12: LEARNING ORIENTATIONS OF SOCIAL WORK GRADUATES IN AN ADMINISTRATIVE POSITION (n = 7)

	Concrete Experience		Reflective Observation	
	Mean	SD	Mean	SD
First Job (1)	5.1	1.7	4.9	2.0
Current Job (2)	4.9	1.2	5.1	1.2
One-tailed t-test	T	p <	T	p <
(1) with (2)	-.4	n.s.	.8	n.s.

	Abstract Conceptualization		Active Experimentation	
	Mean	SD	Mean	SD
First Job (1)	4.1	1.9	4.3	2.6
Current Job (2)	5.1	1.2	6.0	1.2
One-tailed t-test	T	p <	T	p <
(1) with (2)	1.6	.10	1.7	.10

SD	Standard Deviation
n.s.	nonsignificant at the .10 level

FIGURE 6-11: CHANGE IN LEARNING ORIENTATIONS BETWEEN FIRST AND CURRENT JOBS FOR SOCIAL WORK ADMINISTRATORS (n = 7)



Legend: For "self": (1) I avoided this orientation; (2) was unconcerned; (3) responded to; (4) sometimes chose; (5) worked at; (6) preferred; (7) organized my life around.

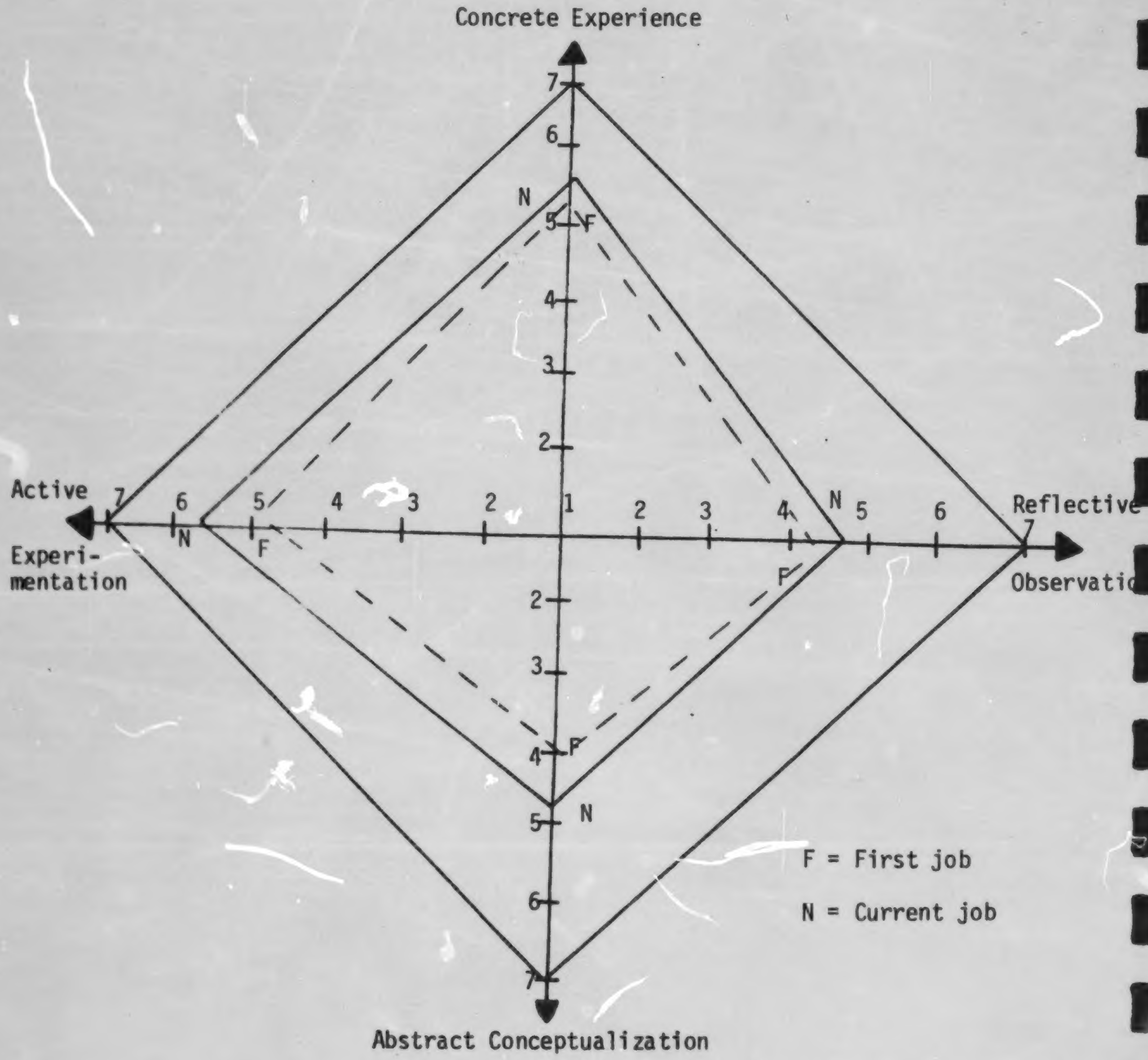
TABLE 6-13: LEARNING ORIENTATIONS OF SOCIAL WORK GRADUATES IN A SUPERVISORY POSITION (n = 8)

	Concrete Experience		Reflective Observation	
	Mean	SD	Mean	SD
First Job (1)	5.4	1.1	4.2	1.1
Current Job (2)	5.6	1.2	4.5	.8
One-tailed t-test	T	p <	T	p <
(1) with (2)	.8	n.s.	.8	n.s.

	Abstract Conceptualization		Active Experimentation	
	Mean	SD	Mean	SD
First Job (1)	3.9	2.0	5.0	.9
Current Job (2)	4.6	1.8	5.6	.9
One-tailed t-test	T	p <	T	p <
(1) with (2)	1.3	n.s.	2.4	.025

SD Standard Deviation
n.s. Nonsignificant at the .10 level

FIGURE 6-12: CHANGE IN LEARNING ORIENTATIONS BETWEEN FIRST AND CURRENT JOBS FOR SOCIAL WORK SUPERVISORS (n = 8)



Legend: For "Self": (1) I avoided this orientation; (2) was unconcerned; (3) responded to; (4) sometimes chose; (5) worked at; (6) preferred; (7) organized my life around

Finally, social workers in direct service report no significant changes in any of their learning orientations, conform to the corollary to Hypotheses 3 and 4. (See Table 6-14 and Figure 6-12.) It should be noted that the size of this particular cell (n = 4) barely meets minimum standards (often set at 5). Yet the results follow too nicely the predictions as well as similar results for the comparative cell for engineers, for them not to be presented.

While the previous results support the view that the higher the career level the more nondominant learning orientations are brought out, it must, however, be tested whether other explanations are possible that would compete with the present underlying theory. As argued in the Theory Chapter, three arguments can be made on the development of learning orientations in careers. Hypothesis 5 translates the trait view, which argues that learning orientations stay very much put throughout life. Hypotheses 6 and 7 translate the maturation view that if changes towards the emergence of nondominance are observed, they are due to the process of aging. Both these views, then, can be tested in contrast to the adaptation view in Hypothesis 8 which argues for an adaptation between personal learning orientations and demands in the environment.

To test the comparative strength of these hypotheses, eight multiple regression equations were solved. Each equation has three independent variables, one for each hypothesis as explained in the Method Chapter. By letting the three independent variables compete to "explain" a share of the variance in the dependent variable, while controlling for the others, their relative strengths can be gathered, and hence the strength of the respective hypotheses for which they stand.

Four such regression equations were written, one for each of the learning orientations. The four were solved separately for subjects with an engineering degree and for those with a degree in social work, resulting in a total of eight, multiple-regression equations.

The regression results for the engineering sample (see Table 6-15) show moderately strong multiple correlation coefficients for the four equations. Among the partial regression coefficients only the perceived demands at their current jobs reach a moderately strong level. This lends the overwhelming support for the adaptation view in Hypothesis 8. However, also minor support goes to the variable age of Hypothesis 6 which shows up with a moderate significance when related to personal orientations toward Active Experimentation.

The results for the social work sample (see Table 6-16) are equivocal. The adaptation view is supported for Active Experimentation and also, but with a smaller partial, for Abstract Conceptualization. On the other hand, the trait view gets support for Reflective Observation, Concrete Experience, and a bit less for Abstract Conceptualization where it competes with the adaptation view.

It should be noted, however, that three of the multiple correlation coefficients for the social work sample fail to reach significance. This is no doubt

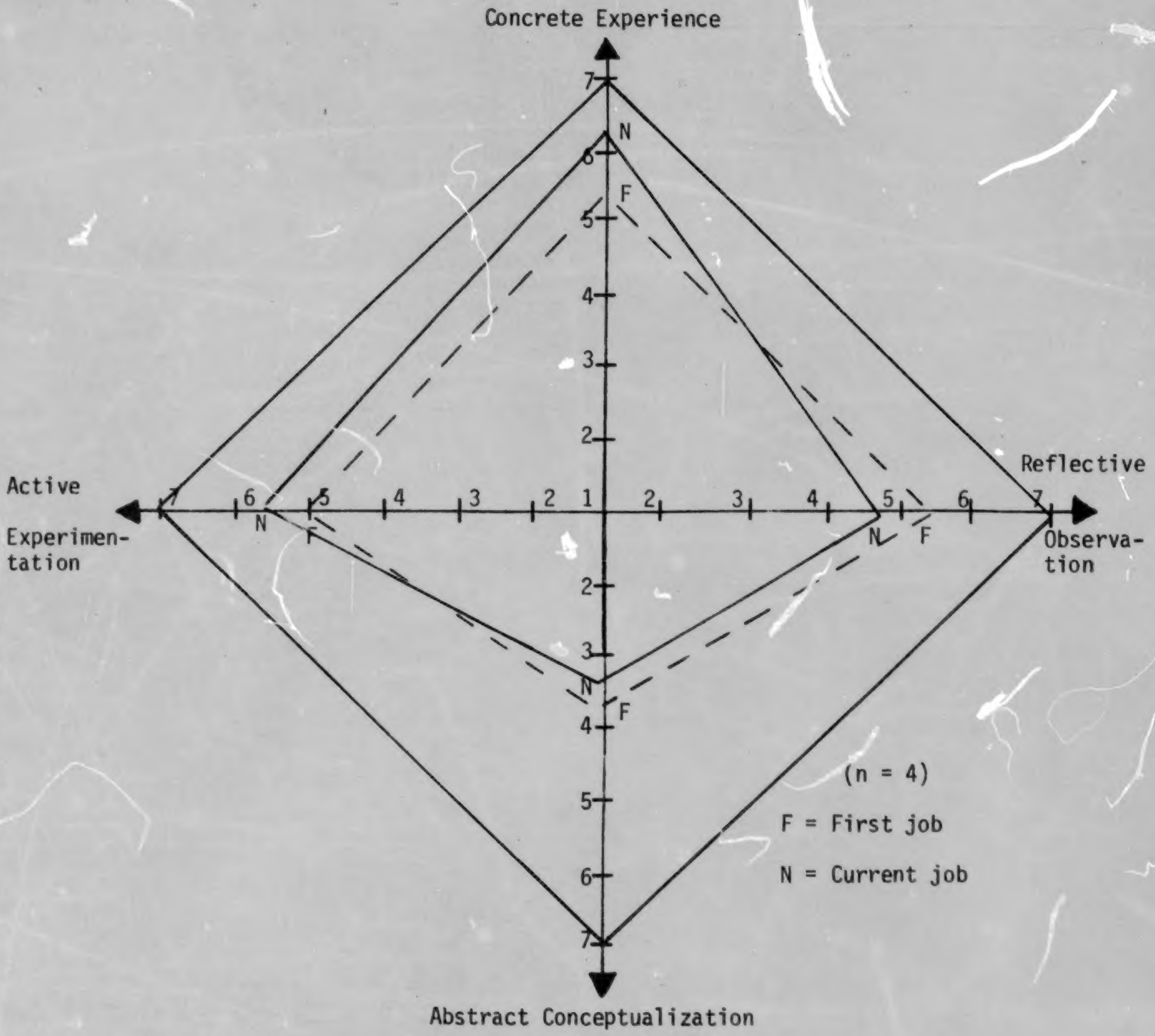
TABLE 6-14: LEARNING ORIENTATIONS OF SOCIAL WORKERS IN DIRECT SERVICE (n = 4)

	Concrete Experience		Reflective Observation	
	Mean	SD	Mean	SD
First Job (1)	5.3	1.5	5.3	1.0
Current Job (2)	6.3	.5	4.8	1.0
One-tailed t-test	T	p <	T	p <
(1) with (2)	1.0	n.s.	1.0	n.s.

	Abstract Conceptualization		Active Experimentation	
	Mean	SD	Mean	SD
First Job (1)	3.8	1.5	5.0	.8
Current Job (2)	3.5	.6	5.5	1.3
One-tailed t-test	T	p <	T	p <
(1) with (2)	-.4	n.s.	1.0	n.s.

SD	Standard Deviation
n.s.	Nonsignificant at the .10 level

FIGURE 6-13: GROWTH OF LEARNING ORIENTATIONS BETWEEN FIRST AND SECOND JOBS FOR SOCIAL WORKERS IN DIRECT SERVICE



Legend: For "Self": (1) I avoided this orientation; (2) was unconcerned; (3) responded to; (4) sometimes chose; (5) worked at; (6) preferred; (7) organized my life around.

TABLE 6-15: STANDARDIZED PARTIAL REGRESSION COEFFICIENTS OF FOUR MULTIPLE-REGRESSION EQUATIONS FOR THE ENGINEERING SAMPLE ($n = 41$), EACH WITH ONE OF FOUR PERSONAL LEARNING ORIENTATIONS AT CURRENT JOB AS DEPENDENT VARIABLE, AND AGE, THE CORRESPONDING ORIENTATIONS AT FIRST JOB, AND THE CORRESPONDING PERCEIVED JOB DEMANDS AT CURRENT JOB AS INDEPENDENT VARIABLES

	DEPENDENT VARIABLE Personal orientations at current job			
Independent Variables	Concrete Experience	Reflective Observation	Abstract Concept-ualization	Active Experi-mentation
Personal orientations at first job	.17 $p > .10$	.03 $p > .10$	.21 $p > .10$	.18 $p > .10$
Age	.10 $p > .10$	.02 $p > .10$	.05 $p > .10$	-.27 $p > .05$
Perceived demands at current job	.40 $p < .01$	.63 $p < .01$	.44 $p < .01$	.76 $p < .01$
Multiple R	.46 $p < .05$	.64 $p < .01$	.53 $p < .05$	.75 $p < .01$
Variance Explained (adjusted)	15%	37%	23%	54%

FOOTNOTES

--The significance of the partial regression coefficients is based on the f-test with df = 1/39; the significance of the multiple R is based on the f-test with df = 3/37. Multiple R-square, or variance explained, is adjusted for n.

--The possibility of an interaction effect between the independent variables age and perceived demands at the current job was tested by adding an interaction term to each of the four regression equations; this led to no improvement of the multiple R, nor to the relative standing of the two variables.

TABLE 6-16: STANDARDIZED PARTIAL REGRESSION COEFFICIENTS OF FOUR, MULTIPLE-REGRESSION EQUATIONS FOR THE SOCIAL WORK SAMPLE (n = 22), EACH WITH ONE OF FOUR PERSONAL LEARNING ORIENTATIONS AT CURRENT JOB AS DEPENDENT VARIABLE, AND AGE, THE CORRESPONDING ORIENTATIONS AT FIRST JOB, AND THE CORRESPONDING PERCEIVED JOB DEMANDS AT CURRENT JOB AS INDEPENDENT VARIABLES

	DEPENDENT VARIABLE Personal orientations at current job			
Independent Variables	Concrete Experience	Reflective Observation	Abstract Conceptualization	Active Experimentation
Personal orientations at first job	.41 $p < .10$	.58 $p < .01$	.50 $p < .05$	.20 p [illegible] .10
Age	-.05 $p > .10$	-.04 $p > .10$	-.10 $p > .10$	.23 p [illegible] .10
Perceived demands at current job	.33 $p > .10$	.02 $p > .10$	.38 $p < .05$	.54 $p < .05$

Multiple R	.59 $p < .10$	.58 $p < .10$	.70 $p < .01$	.58 $p < .10$
Variance Explained (adjusted)	24%	24%	41%	24%

FOOTNOTES

--The significance of the partial regression coefficients is based on the f-test with df = 1/20; the significance of the multiple R is based on the f-test with df = 3/18. Multiple R-square, or variance explained, is adjusted for sample size

--The possibility of an interaction effect between the independent variables age and perceived demands at the current job was tested by adding an interaction term to each of the four regression equations; this led to no improvement of the multiple R, nor to the relative standing of the two variables.

--The addition of a dummy variable for sex did not meet requirements of significance for inclusion.

due to the small sample size. It is therefore prudent to test how the various views get support in the combined sample. This offers the added advantage of integrating the variances of the variables from two, quite different, samples thereby buttressing the validity of the interpretations.

The regression results for the combined sample (see Table 6-17) strongly support the adaptation view on three accounts. Only for Abstract Conceptualization does it compete on an almost equal footing with the trait view.

Discussion. The first part of the results supports the view that as engineering and social work graduates move up into management or administrative positions, they tend to bring out their nondominant learning orientations. These results fit with results reported in Section VI-B. There we found that social work graduates who are in an administrative or supervisory position, score significantly higher towards Active Experimentation, than graduates who are in direct service. They similarly are somewhat more inclined towards Abstract Conceptualization. For engineering graduates, however, there were no significant differences on any of the four learning modes between those who are in management and those at the bench. This paradox between LSI and ACS suggests that both deformation and job adaptation are at work. Indeed, as engineers undergo a more rigorous education, it can be argued that they incorporate certain learning styles as more central in their identity. Yet, as the present results indicate, there is also evidence for presses in the job environment as a counter-vailing force.

The view of adaptation between person and job environment gets strong support in the regression analyses. For both the engineering and the combined sample, the regression results are significant, and point to the explanatory power of the adaptation view in three of the four learning orientations. However, the trait view gets support in explaining the orientation of Abstract Conceptualization, in both the combined sample and the social work sample, each with significant regression results; it does not get support in the engineering sample. One explanation may be that this particular learning style encounters much less variance in the various jobs of social workers.

As to the influence of age, the respondents as they grow older report no significant changes in learning orientations insofar as these changes would be due to maturation and age. Age offers some explanatory power only for engineers: As they grow older they are somewhat less inclined towards active experimentation, although at the same time they perceive their jobs to press for more of it.

These results are basically concordant with Kolb's review of LSI studies (1979), where he remains inconclusive about the influence of age upon learning orientations. There thus seems to be as yet no generalizable statement to be made about gradual evolutions of learning styles according to chronological age thereby somewhat constricting Jung's view.

The implication is quite substantial for the emerging field of studies on the mid-life and mid-career transitions or "crises." Some have offered the magical age of 35 as usually leading to a career crisis. To the degree that

TABLE 6.17: STANDARDIZED PARTIAL REGRESSION COEFFICIENTS OF FOUR, MULTIPLE-REGRESSION EQUATIONS FOR THE COMBINED SAMPLE (n = 63), EACH WITH ONE OF FOUR PERSONAL LEARNING ORIENTATIONS AT CURRENT JOB AS DEPENDENT VARIABLE, AND AGE, THE CORRESPONDING ORIENTATIONS AT FIRST JOB, AND THE CORRESPONDING PERCEIVED JOB DEMANDS AT CURRENT JOB AS INDEPENDENT VARIABLES

	DEPENDENT VARIABLE Personal orientations at current job			
Independent Variables	Concrete Experience	Reflective Observation	Abstract Concept-ualization	Active Experi-mentation
Personal orientations at first job	.26 $p < .05$	.19 $p < .05$	.41 $p < .01$	.12 $p > .10$
Age	.07 $p > .10$	.09 $p > .10$	-.07 $p > .10$	-.07 $p > .10$
Perceived demands at current job	.40 $p < .01$	.49 $p < .01$	.37 $p < .01$	.61 $p < .01$

Multiple R	.50 $p < .01$	.56 $p < .01$	.60 $p < .01$	.64 $p < .01$
Variance Explained (adjusted)	22%	22%	32%	38%

FOOTNOTES

--The significance of the partial regression coefficients is based on the f-test with df = 1/61; the significance of the multiple R is based on the f-test with df = 3/59. Multiple R-square, or variance explained is adjusted for sample size.

--The possibility of an interaction effect between the independent variables age and perceived demands at the current job was tested by adding an interaction term to each of the four regression equations; this led to no improvement of the multiple R, nor to the relative standing of the two variables.

such a crisis should show itself in drastic changes in learning styles at work, the present data fail to find support. Indeed, learning styles do change for many, but age is of little explanatory value. The results imply rather that it matters more THAT a professional moves into management positions than the specific age at which such a change occurs. By implication, a young manager with an engineering degree or a young administrator with a social work degree has to start relying on the same, new learning skills as do older ones.

It should be stressed that the present analysis has been purely exploratory. A subsequent study should balance several of the shortcomings. It should address a bigger sample so that the three job levels for each profession have bigger cells for the t-tests. This would also alleviate the rather small sample for the regression analysis.

Second, the purely subjective evaluation of the learning presses of one's job should be supplemented by a more objective rating by outsiders or at least with a different instrument (such as the 24 item list of job characteristics used by Sims, 1980). Indeed, with bigger samples the two series of hypotheses could be collapsed from t-tests and regression analysis into one analysis of covariance with age and perceived demands at current job as covariates.

VII. Adult Development and Career Development as a Process of Learning

One need not go back too far in history to reach a point where the concept of career was basically irrelevant to understanding social and organizational functioning and the course of individual lives. Before World War I one's choice of occupation and chances for vertical mobility were largely determined by family origin, social class, and geographical/cultural location. Lives were determined more by the chance of birth than by the choice of opportunity. While the ascribed status of class and caste are still the rule in many parts of the world today, in Western technological societies rapid technological change, increased communication and mobility and universal education have effectively undermined these social role determinants of personal identity to the point where Christopher Jenks in his latest comprehensive study of Americans was able to find little association between economic success and social class, level of education and mental ability (Jenks, 1979). What his complex statistical analyses seem to boil down to is that one's career path (at least as measured by the limited criteria of economic achievement) is basically a matter of luck--of being in the right place at the right time and being able to capitalize on it.

These findings are in our view not unrelated to the sudden American preoccupation in the 1970's with the mid-life crisis--a dawning awareness that one's early life course has been shaped by role-bound choices of work and family made at a time when opportunity seemed more limited and consequences less clear. It is in this context that we see the challenge of adult career development as a challenge of learning--of learning to review one's self and one's abilities to seize new and different opportunities while maintaining a coherent yet expanded sense of identity.

For this reason we have chosen a definition of career that goes beyond narrow occupational limits to encompass the person's total life space, emphasizing the central role that self management and personal identity play in defining and shaping its direction. Career is the self mediated progress through time and space of transactions between the person and his or her environment. In this section we will use this definition to explore the developmental dynamics of the career paths of professional men and women.

We are particularly interested in exploring the changing concerns and priorities of these individuals in early adulthood, the mid-life transition period and in later adulthood as they attempt to cope with personal needs for self-fulfillment, new emerging "developmental tasks" in adulthood, and changing social values and structures.

The Phases and Developmental Tasks of Adult Life

The scientific study of personality development, in spite of its major emphasis on the childhood years, has in recent years begun to address the processes of growth throughout the life cycle. In 1950 Erikson published the first of several seminal works on his epigenetic eight-stage model of psycho-social development throughout the life cycle, building on Freud's theory of psychosexual development. This work, in particular, has stimulated the current generation of work on the adult stages of development, c.f., Levenson, et al. (1977, 1978), Gould (1972), Neugarten (1968), and Havighurst (1978) and popularized by Sheehy (1976). In Erikson's model (and in others as well) the stages are precipitated by the convergence of internal and environmental forces which require a new kind of adaptation and from which one undertakes the development of new capacities and strengths. In childhood the internal forces emerge primarily from biological maturation (e.g., the sexual awakening at puberty) and even in later life, biological changes (acute illness, physical deterioration) may impose new adaptive responses. But for the most part the inner forces for change in adults derive from psychological needs.

Environmental forces are similarly more predictable in the early years--mothers no longer tolerate giving constant attention to the post-infancy child, with increasing mobility of the two to three year old, parents must put the brakes on at least the more destructive and intrusive behavior, etc. In the adult stages the environmental forces vary more widely from one career path to another (career defined quite broadly to incorporate both occupational roles and other major walks of life, e.g., childbearing). Nonetheless, for the adult as for the child, significant external events (e.g., the birth of a first child, taking on new major work assignments, becoming responsible for aging parents, being blocked from long dreamed of achievements) whether planned or haphazard, produce changes in the environmental press to which one must adapt. In any case, the emerging centrality of new developmental tasks, marking entry to a new stage, is always a joint function of personal and situational factors. Research on adult development must likewise have this dual focus.

While there are minor disagreements among the authors mentioned above, a general model is emerging from their collective research efforts. The essential features of this model are:

1. Personality development throughout the life cycle occurs through a succession of relatively predictable phases;
2. Within each phase there is a cycle of intensity and quiescence--a disruption to the quasi-stationary equilibrium (in Lewin's terms) of one's former pattern of adaptation leading to intense coping efforts and heightened activity (often involving significant changes in orientation and situational arrangements), followed by establishment of a new equilibrium;
3. The disequilibrium is generated, in each phase, by the emergence of a new focal conflict or dilemma created by new internal forces, environmental pressures and demands, or both;

4. One can cope with the focal conflict in defensive, or developmental ways, i.e., the consequences may be positive or negative, growthful or regressive; and

5. Growth involves the active engagement in a set of "developmental tasks" appropriate to resolving the focal conflicts and satisfying personal needs and social responsibilities.

Havighurst (1978) defines a developmental task as one "which arises at or about a certain period in the life of the individual, successful achievement of which leads to his happiness and to success with later tasks, while failure leads to unhappiness in the individual, disapproval by the society, and difficulty with later tasks." He sees the young adult (20 to 38 or 40) as faced with two basic tasks: "He wants to explore possibilities, before making some permanent choices, especially about his occupational career. At the same time he wants to get himself established in a life structure which offers continuity and growth." The specific developmental tasks of this period are: (1) selecting a mate; (2) starting a family; (3) rearing children; (4) managing a home; (5) getting started in an occupation; and (6) taking on civic responsibility. The major striving during this period (according to Neugarten, 1963) is toward establishing mastery over the outer world. Hence, one's orientation is largely other-directed in keeping with his/her concerns about where and how (s)he "fits" in society. Major preoccupations are achievement and recognition.

Toward the end of this period many people begin to reexamine their purposes, drives and life style. They take stock of their accomplishments and resources, and begin to question what they should do with the rest of their lives. That is to say, they enter the (often disconcerting) Mid-Life Transition.

In middle adulthood the frenetic turning-inward of the mid-life transition mellows to a more quiet preoccupation with inner-life associated with an acceptance of limited time left in life and with increased confidence in oneself and what one can do. The developmental tasks of middle adulthood, according to Havighurst, are: (1) achieving mature social and civic responsibility; (2) assisting teenaged children to become responsible and happy adults; (3) reaching and maintaining satisfactory performance in one's occupational career; (4) developing adult leisure-time activities; (5) accepting and adjusting to the physiological changes of middle age; and (6) adapting to aging parents.

The life cycle thus can be conceived as spanning these broad phases: the formative years up to age 18 or 20, early adulthood to age 38 or 40, and middle-late adulthood. Each of these can be further subdivided for special purposes; in fact, many people experience a much larger number of phases as the conditions of their lives change. We distinguish these three because they typically involve quite different stances toward life each with its special developmental direction.

In childhood and adolescence, the focus is on acquisition of those interests, values, propensities, and competencies that make one a unique person ready to live in the adult world.

The next 20 years or so constitute a period of differentiation and specialization during which the person finds his place in that world and learns how to function more or less effectively within it. Generally during this period one's focus is outward, attending to environmental possibilities and constraints and what one needs to do to adapt to and master living in one's life structure.

Sometime in mid-life there tends to be a (not always deliberate or articulated) questioning and reexamination of one's life and a turning inward of focus aimed toward a more effective and comfortable integration of the whole self and life circumstances. There is, of course, nothing magical about age per se; the shift from one phase to another, while fairly predictable, varies considerably from person to person depending both on his/her psychological condition and on how (s)he is viewed and treated by others.

We think it is also important to differentiate life phases from developmental stage or level. The phases Sheehy identifies, for example, reflect age-related conditions and challenges of life. Developmental tasks are set before one. These may or may not be faced and worked through in developmental ways. Consequently personal growth or increased maturity may or may not accrue from them. Growth in terms of enhancement of self insight, wisdom, competence, ego strength, adaptability, or personal integrity (while perhaps correlated with the movement through life phases) clearly reflects a different conceptual dimension. Changing circumstances and adjustments to them do not automatically imply personality development, although they often provide the conditions and stimulus for growth to occur.

Self and Circumstance: The Complex Challenges of Adaptation

The person is an open system--so much so that we can hardly make sense of one's behavior or experience without giving deep consideration to the environment within which he is functioning. The concept of adaptation is rooted in the transactions between the person and his/her environmental context. The person exists at every moment in a context--some context--which offers opportunities and constraints for meeting personal needs. Moreover, most contexts are quite dynamic, making demands on the person to respond in certain ways and not in others. And these demands often have little to do with the person's needs or wishes. Located in other persons, or group norms, or organizational dynamics, or even the forces of nature, these demands have an agency of their own, independent of the person and his/her purposes. Adaptation involves both pursuing the opportunities for personal fulfillment in the situation and responding to the demands of the situation.

In fact, the person lives in and strives to adapt to two worlds: the external world to which we have just been referring and an inner world that has its own complexities, dynamics, and mysteries. Much of the inner world is rooted in the physiological processes of living, but of perhaps equal or greater importance is a wide range of psychological processes which go on at various levels of awareness, some of which never reach full consciousness. Even while the person is coping with the press of an external context, he/she is also dealing, in some way, with these internal goings-on.

Moreover, the inner and the outer worlds interact. External events stimulate or arouse internal processes whether this fact or these processes are recognized. Similarly, internal processes give rise to behaviors to which others in the environment may be anything but indifferent. Person's behavior can and often does cause changes in contextual dynamics and demands. Hence, the person is faced with adapting conjointly to both worlds.

Levinson (1978) has introduced the concept of life structure, by which is meant the pattern of relationships between the person and his/her significant others, groups and organizations, physical settings, activities, and self during a given period of life. That is to say, at any particular time these two worlds are structured. There are recurrent patterns of interaction which provide stability and need fulfillment and within which the person can function in a more or less meaningful and valued way.

Much about one's circumstances is influenced by forces outside of one's self. Some changes (e.g., death of a loved one) are imposed upon the person--he is a victim of his circumstances--and he has little or no choice but to live with them. Nevertheless, people generally have a great deal of choice in life structure. Even in situations totally defined and structured by others it is the person, more often than not, who chooses whether to involve himself in that situation.

To a considerable extent, once in a situation much can be done to alter one's environment--to restructure conditions and relationships in ways that make them more fitting and fulfilling for the person. For example, a manager may not have full choice in what responsibilities fall witin his purview, e.g., of which subordinates will be assigned to his area, but he often has considerable lattitude in determining how tasks will be approached and in style of management (e.g., participative, or group-centered versus unilateral or one-on-one supervision). Similarly, family members can often re-negotiate responsibilities for various household tasks.

In these terms adaptation is a two way street; one can alter the situation to fit himself as well as adjusting himself to fit the situation. One is active agent as well as sometimes pawn in the flux of changing life structures. Choicefulness in entering, altering, and leaving various environmental structures is ultimately what gives one at least some mastery over circumstances. A consequence of this is that, just as people can create or find living arrangements that give some modicum of comfort, security, and gratification, they can seek out and build new life structures which provide conditions and experiences for further personal development.

Learning as the Core Process of Development

Movement through life's phases may occur with dramatic or only minor changes in circumstantial structure. Similarly, it may coincide with substantial or little or no personal growth and development. One may adapt to new circumstances or new life demands in old ways and, in spite of modification in behavior, remain essentially unchanged by the experience. Yet the changing pressures, conditions, and opportunities are often the ground for new spurts in personal growth.

The difference between mere readjustment and development is a function of the learning that occurs through the experience. Personal development involves increasing self insight and recognition and acceptance of one's complex, ever changing dynamics. It also involves increased understanding of one's world and how it works. It involves increased capacity for taking responsibility for oneself coupled with increased competence in pursuing one's ends in personally fulfilling and socially beneficial ways. All of these increases come about through a variety of learning processes--processes that can occur in any setting and continue throughout one's life.

Some processes of adaptation are reflexive and automatic (e.g., increased heart and breathing rates in times of danger, cold weather, or physical exertion) but the more important kinds have to do with taking in and understanding the world or oneself and acting selectively to influence one or the other. That is to say, those adaptations which have the greatest bearing on career development or personal growth and fulfillment are those which involve one or another process of learning.

Apprehension and Comprehension: The Concrete/Abstract Dialectic

One's knowledge of the world (his/her particular world) is based on two different ways of grasping reality and hence on two contrasting psychological processes which facilitate adaptation. The first involves his here-and-now apprehension and awareness of the specific properties and occurrences in his immediate environment or in his current internal processes. It deals with being in touch with the actualities as they exist at the moment. Polyani (1958) uses the term tacit knowledge for this concurrent awareness and experience of the concrete conditions and events of one's context.

The capacity to tune in to, accept, and appreciate the situation and one's internal reactions in all their vicissitudes is an obvious asset for adaptation, particularly when the situation is itself highly dynamic or rapidly changing. To treat the world as static and guide one's behavior by yesterday's generalizations about it, when in fact it is in flux, leads to misapprehending both the opportunities and constraints and thus to inappropriate behaviors and frustrating experiences. Similarly, to not know what one feels or needs or wants at the particular moment is to misunderstand the dynamics quality of oneself and one's inner world. Because of the continuous variation in sensations and perceptions, feelings and needs in interactions with other people, a well developed capacity for engaging in and learning from concrete experiencing is particularly helpful in adapting to the affective complexities of life.

The second mode of grasping reality--comprehension--is the one we more readily think of when we think of knowing something. That is, we know it through the application of concepts and analytic frameworks. We place it into some category which reflects its similarity to certain other objects, events, or ideas and differentiates it from still others. The capacity to analyze, to isolate elements from their contexts, to trace connections among elements, etc., enables us to know things (objects, events, complex systems, etc.) in their broader reality. The issue here is not in grasping the actuality at the moment of its occurrence, but rather in understanding the wider context, the dynamic functions, the potential utilities, and the predictable outcomes of what goes on within and around us. We gain these understandings largely through symbolic representations and analytic manipulations of these symbols.

The meaning attached to symbols (words, concepts, numbers, models) and the use of one or another logic in their manipulation enables us to reach beyond the fleeting actualities of present time and space, through them, we understand the physical, social, economic, and political worlds; the interdependencies of systems and events; the relationships between action and extended consequences, and the like. Even at its simplest level, comprehension enables us to conceive of distant goals, to identify various tasks instrumental to attaining those goals, and to maintain a sustained effort toward them in the absence of relevant here-and-now stimuli. At more advanced levels, comprehension through symbolic manipulation provides the foundation for the creation and development of the highly complex systems of ideas, problem solving, social organization, production and distribution, and governance upon which our society is built. The capacity to engage in and learn from abstract conceptualization promotes one's adaptation to the realities of the larger world, removed in time and space, and to the symbolic complexities of our culture.

In general, apprehension and comprehension are complementary ways of knowing, and both make their special contribution to adaptation. Nonetheless, we see them in a dialectical relation to each other. That is to say that the conditions that make for successful comprehension often interfere with highly attuned apprehension and vice versa. To engage fully in a concrete experience calls for holding in abeyance one's categories, conceptual schemes and extended meanings in order to drink in the actualities as they occur. An analytic process fractionates and distorts the direct vivid experience, and particularly its holistic and organismic nature. Consequently, artists often suppress thinking in order to observe with clarity and purity--they rely on intuition processes to translate what they observe into artistic expression. Similarly, good therapists work at suspending judgment and categorization in order to tune fully in to their client's affective processes.

On the other hand, our comprehension powers would be quickly overwhelmed if we tried to fully cognize all the immediate sense data in its full complexity. Comprehension requires selective inattention as well as focused attention. We have to break the global and flowing character of experience in order to differentiate and analyze its components and their relationship. Moreover, the emotional reactions and affective loadings that are often intrinsic to the experience (not abiding by most rules of logic), tend to disrupt and mislead the analytic process. Consequently, most scientific disciplines work on a principle of controlled, dispassionate observation and analysis. Emotionality is viewed as the adversary--even the enemy--of rationality. The scientist's affective processes are, at best, seen as irrelevant and, at worst, as destructive to clear thinking and theory building (Mitroff, 1974). Similarly in the comprehension mode, unrestrained observation of an experiential flow tends to be distrusted; as much as possible, data collection is placed in the hands of impersonal instruments which will selectively and systematically record those empirical events which are relevant to the conceptual formulation and exclude all others.

The dialectical nature of apprehension and comprehension, of concrete experiencing and abstract conceptualizing as distinct processes of learning and knowing, can be transcended only through some process of transformation which links the results of one to the other without doing violence to either. It is through such transformational processes that the two become complementary as modes of adaptation, rather than canceling one another out. Reflective observation and active experimentation, the foci of the second dialectic, contribute to transformation of concrete to abstract and vice versa, each in its own way.

Extensive and Intensive Transformations: The Active/Reflective Dialectic

Apprehension and comprehension (or concrete experiencing and abstract conceptualization respectively) represent two different processes through which one acquires knowledge of different kinds. There are also two different processes through which what is acquired is transformed and made useful for the person. These transformation processes are related to the two worlds referred to above--the external world of objects, events, and other people and the inner world of ideas, images, and meanings. This distinction parallels the Jungian concepts of extroversion and introversion. They also constitute alternative modes through which concrete experiences and abstract conceptualizations are related to one another.

The extensive mode carries one's knowledge out to the external world through active expression, through engagement with people or things in a way which has potential for influencing the course of events in that world. As a learning process, the term "active experimentation" conveys the sense in which one's apprehension or comprehension is used empirically in the search for further discovery about the environment. A hypothesis drawn from a conceptual framework is tested through some active intervention which both gives the abstract scheme life and alters the context toward providing a new concrete experience. Conversely, a hunch grown out of a momentary experience may lead to action which confirms or disconfirms one's general comprehension of the situation. Apprehension leads to comprehension and vice versa through active experimentation; perhaps more importantly, the two ways of knowing are complementary as guides to action to coping with the behavioral complexities of life.

One's capacity for extensive transformation is to be found in a potentially very wide range of verbal and non-verbal behavior. The larger one's repertoire of behaviors, and the more one is able to engage in them selectively with subtlety and grace, the more likely one is to adapt effectively in a wide variety of circumstances.

The second transformation process is called intensive because it involves the inner world of images and personal meanings. A concrete experience often stimulates a process of reflection, a mulling over and thinking about the events experienced in ways that enlarge the meaning of the events and make them personally relevant. The term "observation" is used for this mode, not in the sense of sensory intake, but in the sense of drawing a conclusion or making an observation. The process is mental (not psychophysical) and creative (not just receptive).

The ruminations of the intensive mode deal, of course, not only with here-and-now actualities, but also with future possibilities, fantasies, historical recollections, and the like. In one's inner world, time and space are transcended. One can play with ideas and images, draw into juxtaposition things not found together in the environment, extrapolate beyond what is apprhended or comprehended, and formulate new understandings. Hence the abstract and the concrete find a meeting ground in one's reflective processes; Experiences find their place in theoretical frameworks and those frameworks give extended meaning to specific events.

Often the moments of observation are fleeting and transitory, but for those with a highly developed capacity for reflection the process may be protracted and complex. Things take on life in the mind just as much as they do in the world of action. Reflection serves adaptation through its capacity to anticipate, extrapolate, and contemplate that which does not presently exist as well as that which does. The psychoanalytic concept of "reality testing" refers to a reflective process. Whether we construe the world in abstract or concrete terms, the construing itself is an inner process of reflective observation. The construing can be superficial and stereotypic, leading to little new understanding. Alternatively, it can be deep, intensive and creative--for example, through imagination we create new realities as well as new meanings. Thus, one's capacity for reflective observation enables one to come to grips with the perceptual complexity of situations and distant possibilities, to establish purposes and anticipate consequences.

Again, the active and reflective modes are complementary in their contributions to adaptation, and once again, they stand in a dialectical relation in their pure forms. Deep reflection requires a stepping back from the arena of action and the flood of new stimulation. Hence philosophers, theoreticians, and writers seek some form of sanctum sanctorum where they can think without distraction and disruption. Similarly, the activist is troubled at the possibility of being "lost in thought" at the choice point. The moment for action may well go by if one is day dreaming or ruminating over possibilities or captured by his inner associations. The need to be on one's toes, engaged and prepared for action is ill-served by the quiet detachment of introspection. And while action and reflection are both ways of transcending the concrete-abstract gap, they are such very different avenues that it is virtually impossible to be on both at the same time.

Dominant Functions and Specialized Adaptive Styles

Theoretically one can draw on all four modes of learning, each in its appropriate time and place and each in relation to the others, has the highest capacity for adaptation. Indeed, all of us must use each of the modes to some extent, even to survive. However, because of their dialectical nature, people tend to develop a preference for one end of each dimension and to over use it, to the relative exclusion of its opposite end; the dialectual tensions are consistently resolved in a characteristic fashion. Consequently, some modes become dominant, while others recede into the background. As these preferences emerge, one acquires a somewhat specialized style of learning. Four common styles statistically prevalent according to previous research (Kolb, 1976)--involve a pronounced dominance of one mode on each dimension with the other mode in each case being recessive. We have called these four styles the Converger, the Diverger, the Assimilator, and the Accommodator.

The choice of one mode on each dimension facilitates the development of specialized competencies which are highly valuable in certain spheres of life and for particular contributions to society. This choice, when developed to some extreme also involves limitations and blindspots which may hamper the person in other life pursuits. The tendency toward impersonality in assimilators and convergers, while enhancing scientific and technical problem solving, often leads to insensitivity to others and to a truncated emotional existence. The diverger's tolerance of ambiguity and capacity for holding on to many options and diverse perspectives may incapacitate him for decisive action in critical moments. The accommodator's strength in dealing pragmatically with the pressures of the moment may dull his appreciation of eternal verities and poetic nuances.

The French phase la deformation professional nicely captures the tendency for those who become highly specialized in certain adaptive capacities (enhancing selected career pursuits) to become less adaptive to other circumstances and less well rounded as total persons. But there are other less specialized, more comprehensive styles which do not impose such handicaps. At a somewhat higher level of integration there is what might be called a lateral-specialized style, in which the person uses one of the basic styles in some life contexts and pursuits (e.g., in career) and another basic style elsewhere (e.g., in family life). An engineer, highly convergent at work, may nonetheless develop intimate relationships at home through the use, in the latter setting, of accommodative adaptive modes. Similarly a manager may be highly active and concrete (i.e., accommodative) in his business pursuits, but pursue an interest in history or philosophy or the arts in a divergent pattern, these avocational interests requiring much greater reflectiveness. In each of these cases, the person regularly uses alternative modes of learning and adaptation, but avoids the dialectical tensions by dividing his/her world into separate spheres within which different two-mode styles function reasonably well. The shifting from one basic mode to another is based on the recognition (or assumption) that the "mentality" appropriate to one context is inappropriate to another. In these cases, a basic adaptive style seems to go with each major role one takes in life, and the capacity to change roles allows the person to make more diverse social contributions and to seek a broader range of fulfillments than would be possible through the exclusive use of one basic style.

An even more advanced adaptive style incorporates three learning modes in the same adaptive process in which one of the dialectics is truly transcended and integrated. For example, an architect may develop an astute capacity to merge apprehension and comprehension through extensional problem solving, i.e., to be both analytical and attentive to concrete actualities in the design of an artistic and utilitarian structure. Similarly some physicians develop an unusual ability to link their abstract conceptual knowledge of physiological processes with personal engagement in the treatment of a client. In like manner, it is not unusual for anthropologists or psychologists to range from very concrete to highly abstract through intensive reflection. The active/reflective dialectic is also sometimes transcended either through a highly developed capacity for apprehension (as in the creative actor or psychotherapist) or through broad comprehension (e.g., the theoretical physicist who both extends and applies his knowledge in the space program).

The most highly developed adaptive style involves the flexible use of all four learning modes in various creative combinations. Although everyone uses all four modes to some extent, it is rare to find all four developed to a high level of competence and even more rare to find them used in an integrated, flowing manner.

The three broad phases of the life cycle and their associated developmental tasks provide increasing opportunities for the integrative development of one's style of learning and adaptation. In this, as in other aspects of human growth, childhood and adolescence is viewed as a period of acquisition of an adaptive style which facilities his/her entry into the adult world. (For many professionals, we believe this phase may extend well into the 20's.) The specialization phase of early adulthood (20's and 30's) generally is accompanied by an accentuation of one's adaptive style. Through career socialization and adjustment to specialized adult roles, convergers become even more convergent, accommodators more accommodative, and the like. These accentuation forces, stemming both from personal style and environmental press, account in large measure for the kinds of professional deformation referred to above.

During the mid-life transition, one is faced with (and under favorable conditions, comes to grips with) the limitations of his/her specialized style. Some, at this time, back away from the disquieting tensions associated with change and retrench in the continued use of a familiar (even if sub-optimal) style. Others (perhaps more fortunate) engage in an extension of their adaptive style toward an incorporation of here-to-for non-dominant modes of learning and adaptation. For them, the quest is toward integration of experience and adaptation in middle and late adulthood.

Preliminary Findings on the Specialization-Integration Hypothesis

Our research program on Learning and Adult Development has produced some interesting evidence on the importance of specialization in early adulthood and on the quest for balance and integration in the mid-life transition. The evidence to date gives some substantiation to the general hypothesis and suggests the particular issues and approaches to coping with them differ depending on one's basic adaptive style.

The first study is an intensive, longitudinal investigation of mid-life transitions of men and women, aged 35-50. Data collection began with an extensive life-history interview delving into education, career, family, significant relationships, past and present transitions, sources of stress and methods for dealing with it, and aspirations for the future. Those who seemed to be undergoing or entertaining a significant personal transition were asked to complete a battery of personality inventories including Kolb's Learning Style Inventory, a new instrument called the Adaptive Style Inventory based on the same conceptual model, the Myers-Briggs Type Indicator, the Loevinger Sentence Completion measure of Ego Development, and the Social Readjustment Scale (a measure of cumulative stress from significant life experiences).

They were then invited to participate in an intensive three day self-assessment workshop which contained modules on past developmental phases and experiences, life structures and significant relationships, identity and experiences of self, career issues and orientations, stress and coping, and the like. Participants are then tracked over a 12 to 18 month period after which they will engage in a second workshop. Sixty-six professional and managerial men and women have been through the initial workshop to date.

The second study--the alumni survey of 494 professional engineers and social workers ranging in age from 24 to 63--focuses on major life issues and developmental tasks in different phases of adult life. Data include educational and career history, learning and adaptive style, critical skills involved in work, and the personal importance at this point in life of 24 developmental tasks.

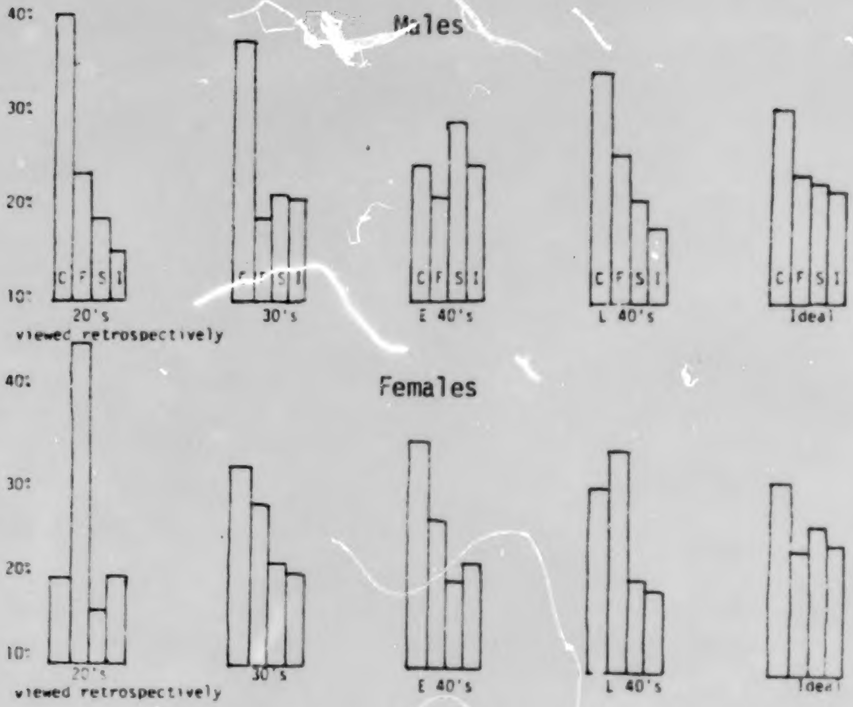
There is some overlap in the samples from the two studies. All but a few are presently working professionally, although a substantial number have made or are considering dramatic changes in their career direction.

Personal Investments in Major Life Pursuits

As one part of the first study, the participants were asked to indicate the relative proportion of their time and energy which they invested in four areas of life--career, family, self, and interpersonal relationships. They indicated the distribution of investments as it is now in their lives, as they recall it being in their mid to late 20's, and as they would ideally like it to be. Figure 7-1 presents the results by age for men and women separately.

FIGURE 7-1

DISTRIBUTION OF PERSONAL INVESTMENT IN
CAREER, FAMILY, SELF, AND INTERPERSONAL RELATIONS
BY AGE AND SEX
(percent of total investment of time and energy)



Perhaps the first thing to note is the close similarity in "ideal" distribution for men and women (they are all professionals or managers). Career is seen as worthy of about 30 per cent of their total effort, and family, self, and relationships as deserving just under a quarter of their psychic energy. Moreover, the standard deviation is smaller for the "ideal" ratings than for the present or retrospective ratings. There is a substantial consensus within this mid-life group on the ideal distribution of personal investment--and the ideal is something close to a balance.

Men start their adult lives with a major investment in career, largely at the expense of self and interpersonal relations. According to their recollections, they put in two to two and a half times the effort to launch a career as they did to developing and maintaining self or relationships. Those now in their 30's are still highly specialized on career, although they tend to themselves and friendships at something more closely approximating their ideal. It is the family that is slighted during this period.

In the early 40's--the time most closely associated with the mid-life transition--there is a sharp reversal for men. Investment in career has dropped to a moderate level, calling for no more energy than personal relationships. The self has emerged as the dominant concern, having been previously relatively ignored except as it relates to career development. In the past transition period there is a return to career and the emergence of family as a major investment. For some this latter finding reflects an effort to renew an old marriage as the children leave home. For a number of others it represents an investment in a new marriage to replace an old one eroded through time and neglect.

The pattern for women is substantially different. They look back on their 20's as having been just as highly "specialized" (in terms of relative investments) as the men--but the specialization is in family, at the expense of all the other areas. The self and one's development as a total person suffered particularly, according to their retrospective views. Those now in their 30's are investing more in career than in family, although the latter still demands considerable attention.

The mid-life transition for women is much less a turning-inward to self (as it is for men), but rather a major reaching outward for career development and achievement. Having denied themselves self-actualization through career, their priorities in the early 40's are not unlike men in their 20's and 30's, though not as extreme. In the post-transition period, family returns as the major investment, with career as a close second. Paradoxically, women idealize the development of self as worthy of more investment of time and energy than they are ever able to devote to it. The demands, first of family, then of career continually over shadow attention to self and personal friendships, although this, we believe, may be changing.

The conclusions to be drawn from this are that: (1) the 20's and 30's are a time of specialization, (2) that the movement is toward balance--toward the "golden mean" revered not just in Greek philosophy but by Americans in mid-life--and (3) that the mid-life transition is a time of addressing the imbalances and attending to the underdeveloped sides of life (self and relationships for men, career for women).

An additional finding from the first study has to do with the shift from outer to inner directedness in mid-life. In mid-life, men and women alike report having been substantially role bound in early adulthood. That is, they saw themselves as entering pre-established roles, as accepting them as "givens," and as overly preoccupied with fulfilling the expectations of others. Moreover, both groups were highly impressed with the power others had and with how little they had themselves. Consequently, they were relatively dependent and looked to others for the initiative in many situations. They also turned to others for basic confirmation of their personal competence and worth. Women particularly saw themselves as passive, dependent, and role bound.

This outer directed pattern is highly adaptive because in entering the adult world and starting a career, a family (or other living arrangement), and a new life style, there is much to learn about how the world works and about what it takes to be a success in life. For dreams of achievement and fulfillment to become realities, one has to know the world not just in abstract terms but in terms of the particular social and organizational dynamics which they will face and which will provide the opportunities and constraints for various kinds of satisfaction and self actualization.

As one gains more mastery over the environment and more competence in the tasks involved in work or family or relationships, the power of others is less impressive. Both men and women become more independent, less passive, and more owing of their own powers. They are also much more adept at finding both the standards and the resources for self validation. While neither men nor women (in general) have reached a point where they are carving out their own roles to fit themselves, they have become much less dominated by a need to fulfill the expectations of others.

Women started adulthood with a more outer-directed stance than men. By mid-life they are nearly equally inner-directed on all the dimensions identified above. Much of the movement toward inner-directedness can be attributed to the adaptive success of outer-directedness; i.e., the attention to the environment and to functioning effectively and appropriately within it results both in the acquisition of a range of competencies for successful self-direction and in bringing the adult world down to size.

Another part of the movement toward inner-directedness derives from the failure of outer-directedness as a general adaptive stance. While the latter tunes one in to the dynamics, the requirements, the opportunities, etc., in the environment, it belittles and blinds one to one's own internal dynamics. If one accepts whole-hog the role and the public image of the successful engineer or manager or social worker or scientist, and takes that on as one's identity, it will inevitably be false in some regards no matter how successfully one enacts the role. No role system, no institution, no organization takes into account the full complexity of a human being. Various personal needs and feelings, fears and aspirations are, of necessity, overlooked if not actively thwarted. One cannot *be* a role without doing some violence to him/herself, no matter how good one is at it. Consequently, in mid-life there is a demand from within to de-cathect the outer world of institutions and expectations and to attend more directly to one's own nature and possibilities.

Developmental Tasks and the Adult Life Cycle

In the second study of professional men and women we used an instrument--the Life Issues Inventory--which tapped the importance to the person (at his/her particular point in life) of 24 developmental tasks which have been identified in the adult development literature as especially significant at one or another phase of adulthood. The following seven clusters of items emerged:

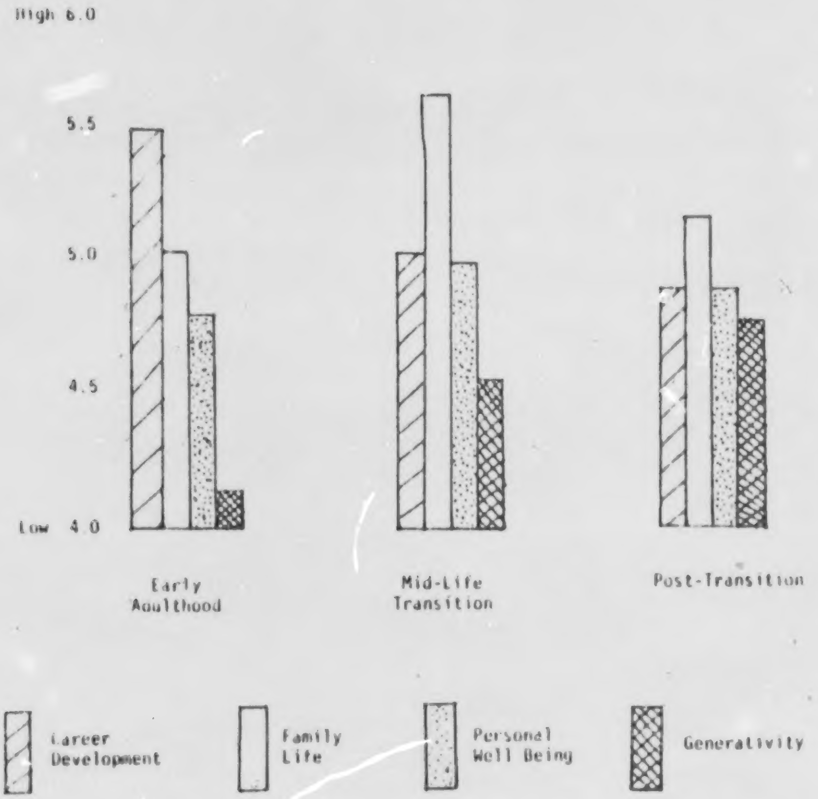
1. *Career:* Financial aspirations and attaining success in one's chosen line of work.
2. *Competence:* Learning specialized knowledge, skills, and expertise.
3. *Career Development:* A combined index incorporating career and competence.
4. *Family Life:* Having a rewarding marriage and family life, including raising children.
5. *Personal Well Being:* Coping with stress, dealing with change, maintaining physical health and well being.
6. *Self Awareness:* Getting in touch with feelings, changing goals and activities to fit oneself, becoming one's own person.
7. *Generativity:* Attaining a broad perspective and making a contribution to society, to community affairs, and to the next generation.

While these indexes do not include all the developmental tasks people undertake at various points in life, they represent major areas of concern for most professionals. Figure 7-2 presents the mean importance of four clusters of life issues (career development, family life, personal well being, and generativity) for three phases of adult life--early adulthood (24-40), the mid-life transition (41-45), and the post-transition period of the late 40's and 50's.

Career development is the dominant issue of early adulthood. Making an appropriate career choice, acquiring requisite professional education, adjusting

FIGURE 7-2

IMPORTANCE OF MAJOR DEVELOPMENTAL TASKS BY PHASES OF ADULTHOOD



to a professional role, and developing competence for long term success are the pressing concerns of professionals in their 20's. While many strive to hold their options open during an extended period of acquisition, the focus is on finding and preparing for a professional career.

Formal learning becomes less important in the 30's, but gaining competence through experience and recognition through dedicated work are major pursuits. The "settling down" period (as Levenson and others refer to the 30's) shows some drop in concerns about career development, not because it is unimportant or less demanding of time and energy, but because it is less problematic. Important choices seem to have been made and investment of effort toward achievement is targeted and channelized. Most professionals in their 30's have entered their chosen field, have been socialized into relevant organizational and role relationships, and are following a program for advancement and recognition--a success formula, most often shaped by others in the field.

In the mid-life transition, career development drops in importance for most professionals, while they turn their attention to family and self. For a substantial minority, however, career is in crisis at this time and is the area of deepest concern. Many find that their heavy investment in dreams of "success" have not paid off, that their careers have plateaued and they are no longer moving onward and upward, and even where they have obtained substantial recognition in the eyes of the world they are not experiencing the rewards and joys of success they anticipated so strongly. Many pull back from the intensive drive--the rat race--to reconsider their career directions and at least contemplate changing jobs, location, or even fields.

Those professional women who have dedicated much of their early adulthood to raising children go through a major transition in the late 30's and early 40's. Many return to graduate programs at this time and face both the return to student status and the challenge of developing competencies which may have never been acquired or at least have atrophied through lack of exercise. Perhaps more important, many go through an identity crisis as they seek new orientations to self-in-the-professional-world. New modes of coping and adaptation, and new styles of relating to colleagues and supervisors are frequently required. While these experiences generally are exhilarating, they also tend to be disorienting and stressful, at least temporarily.

In the post-transition period of the late 40's and 50's, career continues to be quite important, but not the dominating factor. Those who do change careers tend to throw themselves into a new (and often exciting) phase of developing competence and experience, at least for a time, a sense of professional and personal renewal. Others continue to practice their professions with relative confidence and contentment, leaving behind the (often frenetic) soul searching of the mid-life transition. Some, of course, fail to come to terms with the inevitable partial, or even major, failure of their career dreams and go through a period (sometimes lasting to retirement) of career stagnation and disgruntlement with self and/or the field.

Family life is only of moderate concern for most professionals in early adulthood. Marriage generally occurs in the 20's, and needs for intimacy and for a home independent of family of origin become acute. First children are also often born before one reaches the 30's, placing strenuous new demands on mothers if not fathers. Nonetheless, in spite of the joys and cares invested in family, this is only a secondary concern for most professionals in their 20's. Developing a satisfying family life is all too often treated as a task to be done with the left hand, while the "more important" work of launching a career receives central attention. More than a few young professionals--men and women alike--view family and children as an important goal in life, but also as a source of distraction and constraint from career development which, underneath, they experience with resentment as much as joy.

Later in the 30's, family life becomes a more pressing concern, peaking as the dominant issue in the mid-life transition. For some professionals this occurs because career is reasonably well in hand and they can now turn more attention to the fulfillments family has to offer. For others, the concern grows out of the strains and difficulties in their families, which inevitably arise but which have been allowed to fester through neglect by those overly devoted to career building.

Beyond these two situational factors, which are pressing enough in themselves, are two internally induced factors which tend to make family life the most pressing issue during the mid-life transition. The first is the shift from outer to inner-directedness discussed above. The early adult quest for professional identity and achievement often leads one to view him/herself in functional terms--what am I good at? and what am I good for? The raison-d'entre for living becomes the utilization of one's talents and competencies in the service of future goals and objectives. One falls into a pattern of "delayed living" while striving to meet the demands and expectations of significant others in the quest to get ahead.

In mid-life, as one becomes more fully one's own person, the expectations of others have less influence. No longer content with viewing self in functional utilitarian terms, there is increased interest in the here-and-now. Among the things desired is a more authentic involvement in the everyday warmth and joy family life is supposed to offer but only rarely has been experienced. If the marriage is strong and spouse and children receptive, renewed attention to family brings these rewards and the attention is reinforced. Where relationships have deteriorated through emotional distance or heated conflict, mid-life professionals often turn elsewhere for more intimate and satisfying experiences.

The second internal force toward increased concerns about marriage and family is related to the above though with different roots. As many reach 40, they begin to be concerned with time running out. While in the 20's there seemed to be time enough in life to eventually fulfill all one's hopes and aspirations; it now becomes apparent that this is a myth. Especially if one has fallen into a specialized routine--a rut--one begins to recognize that life is apt to offer only more of the same until one is too old to have some of the pleasures and fulfillments which have been denied in the name of career. Many engage in a subtle--or not so subtle--effort to reconfirm their youthfulness. Getting "the old bod" in shape through jogging, exercise, diet, and sports is one such effort. Another common effort, though less well recognized and understood, is manifested in an increased concern for appearance and attractiveness, especially important in our youth-oriented culture. Sexuality becomes more important--even urgent--in contrast to its relative quiessence in the 30's. Given fortunate circumstances, new experimentation and excitement is found in marriage. But in marriages that have become dull and routine or distressed with disappointment and conflict, extra-marital affairs (adding further to the strain) or divorce and remarriage are commonplace about this time.

The emergence of family life as a (and often the) critical issue in the mid-life transition is often over determined, as can be seen from the discussion above. It is no accident that so many professionals in our sample view marriage and family as the flipside of career, complementary to it in the ideal, but in a state of dialectical (and sometimes antagonistic) tension. Generally, but of course not always, the more one has specialized in and devoted oneself to career development in early adulthood, the more pressing family and intimate relations become in mid-life. Many professional women find the obverse to be equally true--exclusive dedication to family responsibilities in early adulthood leads to intensive concerns for career development in mid-life. On the whole, family life continues as the most pressing concern in the post-transition period, but generally without the urgency and stress associated with it during the mid-life transition.

Personal well being throughout the discussion above are references to the self and to a sense of personal well being. In the 20's the issues involved in breaking from family of origin, establishing a separate existence, choosing a career, and developing and testing one's competence, are all sources of stress as well as growth. Changes are frequent, relationships and commitments are made and broken, new situations are faced and dealt with, and ambiguity is common if not rampant. Consequently, concerns about one's personal well being tend to be quite important, though not as intense as those for career development or even for family development.

Life settles down during the 30's for most professionals. While the race to get ahead may be challenging and intense, routines become established for handling many situations in and out of career. Coping methods, on the whole, become more reliable, if not too effective, in the long run. One finds his/her place and a more or less adequate way to be in it. Gains in professional competence and personal strength are realized. Therefore, concerns about personal well being decline in the 30's.

During the mid-life transition, as we have seen, they become urgent again, even more pressing than they were in the 20's. The increased investment in the family--and the troubles experienced around it--take on a personal quality they often lacked in early adulthood. Possibilities of career change are also addressed in personal terms. The nature and meaning of one's life and how it is being lived are called into question and much that was taken for granted becomes unsettled--and unsettling. Many back away from the busy-ness of life and work to engage in periodic and sometimes prolonged reflection and introspection. Certainly, everyone does not experience a crisis mid-life, but almost all face some stressful and disquieting moments. In any event, coping with stress and change become important personal agendas at this time.

In a sense, the mid-life transition is predominantly a time of tuning inward and working on the self, in spite of the frenetic activity and unexpected (if not inexplicable) behavior in some people at this time. And the growing number who make fairly dramatic changes in career, family, and life style notwithstanding, the mid-life transition fundamentally involves coming to terms with who one is and taking responsibility for one's life course. These may be addressed through deep reflection or active experimentation, through long internal analysis and problem solving.

Any and all of these can be productive in coming to grips with how one has been living and in finding more fulfilling and self responsible ways of living. And, of course, many people experience the uneasiness, confusion, and tension of these various mid-life issues, but fail to address them in productive ways. The time may be ripe for some important personal work, but that work is not always pursued and few people seem to accomplish it well. Although some find remarkable self-renewal and many gain a more basic acceptance of self and one's lot in life, a mix of partial gain and defensive retreat seems to be more like the norm.

In the post-transition period concerns about personal well being are still prominant--as important as career, in fact. At least three different forms are found in these concerns, forms associated with somewhat different developmental tasks. First, for a substantial number of people, the preoccupations of the mid-life transition continue well into the late 40's and early 50's. Those factors discussed above as sources of stress still hold for this group. Second, those who make significant life structural changes (e.g., new job or career, new marriage) are concerned about consolidating and managing those changes. Third, most people as they grow older are troubled to some extent by possible loss of energy and ill health. Some, of course, experience heart attacks, periods of illness, major operations and the like, but even those who do not,recognize the escalating potential and face it with increasing concern.

Generativity is the term we have given to the fourth index represented in Figure 7-2. Its components include gaining an understanding of the "big picture" and making a contribution to society, to community affairs, and to the next generation. There is little interest in these issues for most people in early adulthood. Even in those professions like social work and education which are oriented toward social contributions, these concerns are quite modest; other issues over shadow them by far.

During the mid-life transition, generativity becomes somewhat more important as one questions the ultimate relevance and value of his or her work. The search for a broader perspective on oneself and one's place in the world also becomes more critical during the transition.

It is only in the post-transition period, however, that generativity becomes a major developmental task. The mentoring role may well have begun in the 30's with somewhat limited meaning. In the middle and late 40's, as one moves out of self preoccupation, this role is accepted and even pursued with a sense of personal and professional purpose. One can view this, as well as contributions to community and society, as an effort to have impact on the field and the world beyond the span of one's career--of gaining some sort of immortality in the face of ever increasing certainty about one's eventual death. But these efforts also provide an active outlet for the more philosophical orientation one acquires as one works through the problems of living and working. Becoming a senior member of the organization, the professional field, and the community, even if a position of power has not been attained, opens opportunities for guiding and helping other younger members. Once the scramble for "success" has been laid aside, there also tends to be more time to devote to social and community needs.

As interesting and important as the details of adult development are, a more general conclusion can be drawn from Figure 7-2. In the early adult profile, one issue--career development--stands out as extremely important. Family and well being are also somewhat important, but no other tasks even come close to the centrality of career for professionals during the early years. This speaks of specialization in two senses of the term: first, in the general sense of focusing energy and attention on one aspect of life, to the relative exclusion of other areas, and second, in the more particular sense that career development for most professionals involves the acquisition and utilization of highly specialized areas of competence.

In the mid-life transition the declining importance of career development indicates not a loss of the specialized competence, but a partial de-cathexis of career coupled with increased concern about other areas of life that have received less attention. The transition profile is hardly less unbalanced than that of early adulthood, but the over emphasized areas--family and self--and the growth that often derives from working on them, counterbalance the dominant strength of the early adult profile.

A more balanced profile is formed among those in the post-transition period. Family still stands forth as the most significant area, but only marginally so. Career, self, and generativity each receive considerable attention.

Apprehension versus Comprehension: Contrasting Processes of Personal Growth and Social Development

A major conclusion drawn from the analysis above is that during the mid-life transition one begins to work on the underdeveloped sides of life. This proposition can be examined more closely by comparing developmental patterns for professionals with different basic adaptive styles.

A particularly interesting contrast is found when those styles which rely on apprehension as a basic mode of learning and knowing (being sensitive to and in tune with the concrete actualities of the here-and-now) are compared with those which rely on comprehension (utilizing abstract conceptualizations and systematic analysis). The first and most important contrast lies in the kinds of professional fields these two groups tend to enter.

The Comprehensional Styles mode of grasping reality is shared by convergers and assimilators. They are generally attracted to the sciences and science-based professions. Mathematicians, physicists, biologists, and economists tend to adhere to the assimilative adaptive style and to be interested in systematic understanding and the generation of knowledge for its own sake. Engineers, technicians, and accountants tend to be convergers and are more concerned about the utilization of knowledge for problem solving.

Both in professional education and initial work experiences, the Comprehension orientation is shown in a capacity for complex analysis based on theory and the manipulation of abstract symbols, including mathematics and a distinct preference for well structured situations and for working in a rational, logical, orderly manner with a relatively low tolerance for ambiguity. The Comprehension orientation tends to be unemotional, impersonal in relationships and role rather than person oriented.

Accommodators and divergers share an Apprehension mode of knowing, Apprehensions tending to be more interested in people than in things. They are drawn toward the humanities and social sciences and toward the applied fields that call for frequent engagement with other people. Managers, social workers, educators, and people in marketing and sales tend to be accommodators, while psychologists, historians, writers and artists tend to be divergers.

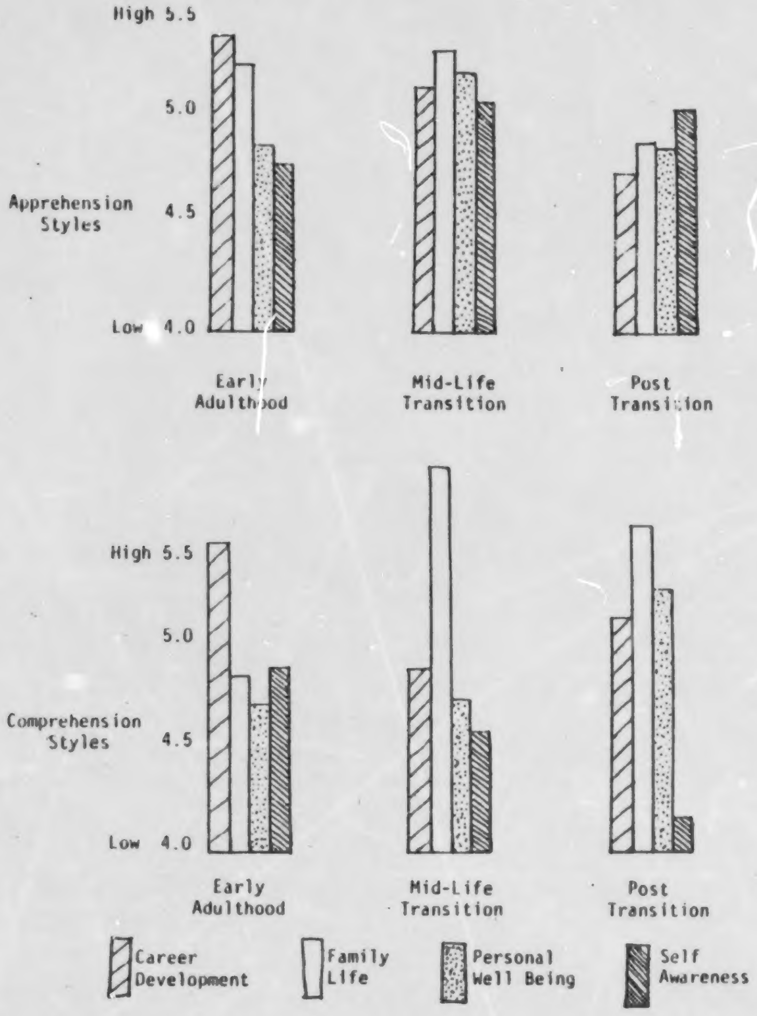
In professional education and work, Apprehension involves a heightened capacity for handling affective complexity, ambiguity, and (for many) group and organizational dynamics. Interpersonal relationships and social influence tend to be very important, and living up to the expectations of others is especially critical in early adulthood. Apprehension as a way of knowing relies more on intuition and involvement in situations than on disciplined logical thought.

Apprehension and Comprehension both contribute to professional growth and development, but in quite different ways and toward different realms of competence. This accounts in large measure for the rather close association between adaptive style and career choice, and also for the tendency toward reinforcement and accentuation of adaptive style when the choice is well matched (see Wolfe and Kolb, 1979 for a more complete treatment of adaptive style and career choice).

Figure 7-3 presents separate profiles for the individuals who were oriented toward Apprehension and Comprehension on four major developmental tasks in the three phases of adult development. Career development, family life, and personal

FIGURE 7-3

IMPORTANCE OF MAJOR DEVELOPMENTAL TASKS BY PHASES OF ADULTHOOD FOR APPREHENSION AND COMPREHENSION ADAPTIVE STYLES



well being are the same indexes as presented in Figure 7-2. The fourth index --self awareness--incorporates getting in touch with feelings, changing goals and activities to fit oneself, and becoming one's own person. (Generativity has been omitted because, while those with an Apprehension orientation are marginally more concerned with it at each point in time, the curves are parallel; both groups increase at the same rate from early adulthood to mid-life transition to post-transition.)

The Apprehension profile in early adulthood stresses both career development and family life. This is in keeping with the affective, interpersonal orientation associated with this way of knowing. The development of professional competence also serves family life. This is not to say that they meet all their families' needs; they are as caught up in career building as anyone else at this stage. Nonetheless, it implies that family has not been too severely neglected and consequently family issues are not over-riding during the mid-life transition.

The mid-life transition tends to be a personal crisis for those with an Apprehension orientation. Having been preoccupied with living up to the expectations of others at work and at home, they now turn inward to self. Becoming one's own person and being in touch with one's own (rather than others') feelings are especially critical. The stresses of trying to do it all--to be effective and impactful in career, responsible and responsive at home, and now to take care of oneself are experienced intensely. It is among this group that one finds the strongest fantasies of tossing it all away and starting a new (usually simpler) life elsewhere in a new field and perhaps with a new mate. Some make rather dramatic changes in career or life style at this time, but nearly all move more toward a sense of personal centeredness. Consequently, in the post-transition period, self awareness and personal well being are every bit as important as career and family, if not more so. Concerns for the latter two issues decline markedly.

The Comprehension pattern is quite different. Career specialization is especially strong in early adulthood. The development and utilization of technical competence is the major agenda and others are relatively brushed aside. What concern there is with self awareness has little to do with feelings; matching goals and activities to personal interests, and becoming one's own person is the issue, and this is in the service of becoming an autonomous professional. Family life tends to be relatively unimportant. Moreover, a Comprehension's approach to the family, especially during this period, tends to be quite conventional and sex-role stereotyped.

The mid-life transition shows a marked reversal for individuals oriented toward Comprehension. A substantial de-cathexis of career development coincides with a major preoccupation with family life. The erosion of the family through boredom and neglect has made this the trouble spot. Family conflicts are apt to be intense and the person's development--detached, unemotional, impersonal--has ill-equipped him for dealing with the problems. The crisis is experienced as in the home, not in the self. Consequently, self awareness and personal well being are relatively unimportant. The developmental agenda in the mid-life transition is toward becoming a social being, a decidedly underdeveloped area for those who approach reality through Comprehension.

The post-transitional period shows a continued centrality of the family. Having discovered not only how little one has been giving, but also how much one has been missing, those with a Comprehension orientation are now acutely concerned with establishing and maintaining a vital relationship within the marriage and with finding a belated personal connection with children who are about to or have left home. The increased concern with personal well being at this time reflects both the stresses of dealing with these changes in personal and home life and with physical deterioration and distress which has accrued through suppression and neglect.

In the later years those with a Comprehension orientation experience a return to concerns about career development. Having turned away from it for a time, what one is doing in career becomes an issue again. Many with this style take on new responsibilities (often managerial) at this time, and the mentoring role becomes important. As a result there is a renewal investment in learning and in the development of new competencies which can be applied in career but also at home and in the community.

Finally Figure 7-3 shows a continuing decline in concerns about self awareness, dropping to a very low level in the post-transition period. Inasmuch as this tends to be an underdeveloped area at the outset, this finding runs contrary to the specialization-integration hypothesis. We view this as a particularly strong professional deformation toward the Comprehension orientation which is not only not counter-balanced in mid-life, but may even become more intense. But having devoted their early adulthood to relatively selfish --albeit one-sided--pursuits, their turning attention to the welfare of others (family, community, and younger members of the profession) leaves little room for further development of their own affective sides.

Extensionality versus Intensionality: Adaptation to Self and Social Role

Let us carry forth our analysis of the effects of adaptive style on specialization and integration by comparing those styles that differ on the extensionality-intensionality dimension. The converger and accommodator share an orientation toward extension. They both live in a world of action, sharing an emphasis on problem solving, decision making and task accomplishment. While they differ in their comfort and competence in working with things versus people (convergers prefer the former, accommodators the latter) they are both engaged in their own kind of behavioral complexity and they both start their careers with a strong interest in having an impact on the world. If they had their way (according to their youthful dreams), they would be "movers and shakers" in the physical and social-organizational worlds, respectively. In fact, for many with an extension orientation to transforming knowledge, the concept of success in career includes the eventual attainment of a position of leadership or management. Consequently, they tend to be attuned to organizational hierarchies and to the responsibilities, authority, and prerequisites of position and role.

In contrast, those with a dominant intentional orientation live primarily in an inner world of ideas and personal meanings, of images and understandings. Although they differ in their comfort and competence regarding symbolic versus affective complexity (assimilators prefer the former, divergers the latter), they share an interest in knowledge, insight, and creativity. Authority of the mind is more important than authority of organizational or group roles. Success in career is associated more with making original, creative contributions to the field and receiving recognition for personal brilliance than with attaining positions of power and influence.

The relative importance of major developmental tasks is presented in Figure 7-4 for those with Extensional and Intensional orientations. Because of our interest, in this case, with role adaptation versus personal development, two new composite indexes are introduced. The career and family scales have been combined into a kind of rough index of role orientation. This is not to obscure the fact that career and family take on different importance at different stages, as we have already seen. Indeed, both Extensionals and Intensionals are more concerned with career in early adulthood and with family in mid-life and beyond. The combined index has been created to underscore the extent to which people focus on external conditions be they at home or at work.

The second composite index--self orientation--combines three scales: personal well being, self awareness, and competence development. Once again, the purpose is not to neglect the important differences among these, but rather to focus on their common element--the development and maintenance of one's self.

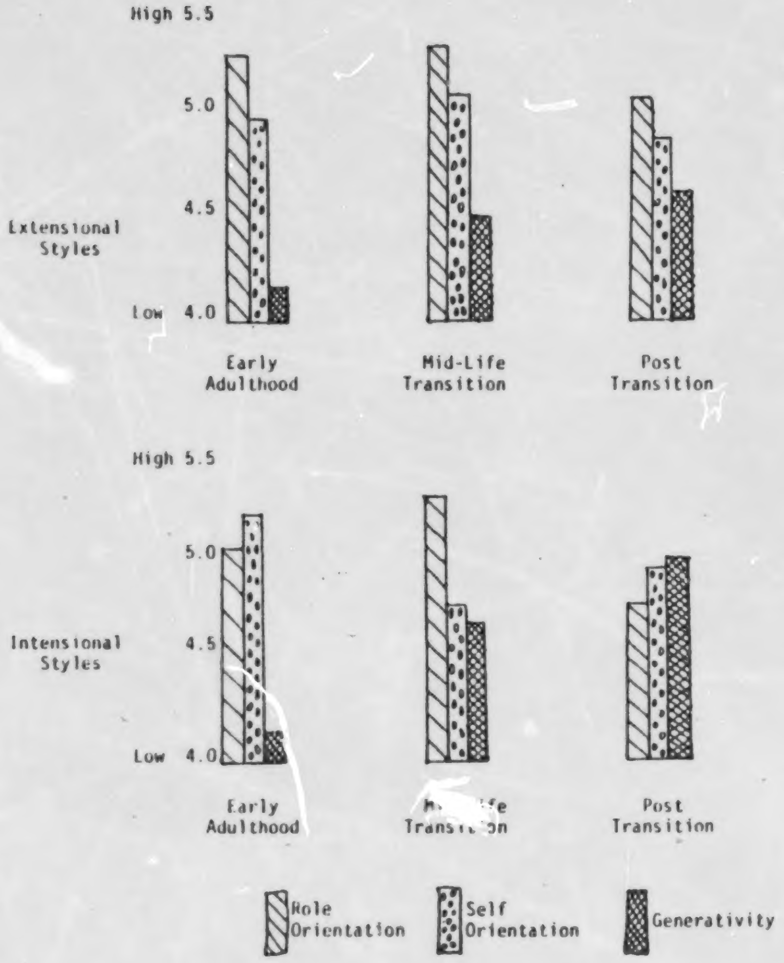
The Extensional pattern begins with the expected preoccupation with role issues. Career and family are both highly important in early adulthood in contrast to somewhat lesser concerns about self. They, especially the accommodators among them, are deeply invested in discharging family responsibilities as well as with taking on the career challenges and getting ahead. Being a successful professional and being a good spouse and parent have nearly equal importance.

Their self orientation in early adulthood is very largely a function of their investment in developing professional competence. Personal growth is important to the extent that it enables one to take on more challenging assignments and to get ahead in career. Self awareness is only moderately important at this time, and the more stress-reflective index of personal well being is still less so.

Those with an Extension orientation face the mid-life transition with even a slightly higher concern about their roles in life, although the shift in emphasis is toward stronger family concerns. Some of this concern centers on exploring the possibility of changing roles, i.e., new career directions or at least jobs, and changes in family structure. But there is even more increase in the self orientation index. Concern with developing competence has dropped, but self awareness and especially personal well being have increased in import-

FIGURE 7-4

IMPORTANCE OF ROLE ORIENTATION, SELF-ORIENTATION, AND GENERATIVITY BY PHASES OF ADULTHOOD FOR EXTENSIONAL AND INTENSIONAL ADAPTIVE STYLES



ance substantially. To some degree this reflects concerns about the stresses which have accumulated in pursuing a busy life, and fears of time running out rear their head. But more importantly it indicates a pronounced turning inward --self-absorption, if you will. The continual attention to external pressures and conditions coupled with a kind of self denial has become too much to tolerate and the internal press for some kind of readjustment has become a force to be reckoned with.

In keeping with the Extension style of adaptation, the first efforts at coping are usually to look for what can be altered in the situation. One begins to think, maybe a new organization or a different line of work will be less frustrating and more satisfying. Or, "Perhaps a new lover will be less demanding and more attentive to my needs." Seeking a solution in the outer world and trying out various possibilities sometimes proves quite adequate, but few escape the intense moments of questioning and doubt. Some basic changes in personal priorities are usually required, and this calls for some deep reflection. Some move from outer-directedness to centeredness is essential.

In the post-transition period those with an Extension orientation express fewer concerns about either self or role, although the latter continues to be stronger. Family life continues to be quite important but less stressful. Interest in learning and developing new competencies in line with new priorities also are prominent. They come out of their inner journey and are less concerned with their own well being. Having, for the most part, successfully negotiated some changes in self and circumstance, they can settle down and turn their attention once again to their now generally more comfortable roles in family and career.

The lower part of Figure 7-4, portraying the Intension style of adaptation, shows something of the reverse pattern. Self orientation in early adulthood is somewhat stronger than role orientation. Career aspirations are the most important considerations for this group (as with the other group) but not as pressing as for those who are Extension oriented. And family life is awarded much less importance than self.

For personal concerns differ somewhat for divergers than for their assimilator counterparts. The former are less clear about what they want to be and do in life. Their interests tend to be diverse and unstable. Their personal preoccupation reflects an extended search for themselves and for a personally meaningful path to follow. Assimilators are equally high in concerns for self but this tends to be associated with the stress involved in preparing for and entering highly complex and challenging scientific and technical fields. Hence the concentration is on developing competence. Even the more astute among them have their moments of questioning whether they will be bright enough and creative enough to make a real contribution to the field.

In the mid-life transition, self oriented concerns decrease markedly and role related issues become more important. Family life in particular is quite pressing at this time, largely because it has been so neglected previously. Family problems are particularly intense for those who have been most into themselves or who have devoted themselves most exclusively to developing and exercising their specialized competencies. Inasmuch as Intensives tend to withdraw and pull further inward in the face of conflict or stress, the early signs of marital difficulty are apt to be overlooked. Therefore, it is often only when those problems are nearly beyond repair that they come into full awareness.

It would be wrong to conclude, though, that all the turning from career and success goals and personal concerns toward family is based on family stress. As one becomes established professionally and gains (literal or de facto) tenure in their field, career pressures and competence testing eases off. There is now more time for enjoyment of family and other interests. Generativity also becomes more important at this time.

The post-transition profile for Intensives is quite the opposite of that for Extensions and is a substantial reversal from their own transitional experience. While they maintain a substantial balance, generativity has become the leading issue. Their propensity for reflectiveness takes on a more philosophical spirit in the middle years as they strive to place themselves and their work in the larger scheme of things. Moreover, generativity serves as a counterbalance to the relative selfishness of early career. Intensives, more than the others spent more of their early adulthood taking in--learning, acquiring expertise, gaining autonomy. Less of their attention was directed toward "delivering the goods" than tended to be the case for Extensions. Middle adulthood is the time for giving. Mentoring becomes an important and rewarding professional function, and service to community and society takes on significant personal meaning.

Those who are Intension oriented are still concerned in the post-transitions years, with their own welfare. They still experience and cope with stress. They still attend to learning and developing new understandings and insights. And they, like others, experience growing concerns about physical health. But neither self nor role-oriented concerns are as important--or plaguing--as previously. Many of them have been put, for the most part, to rest.

On the Quest for Integration in Mid-Life

The concept of personal integration is complex and elusive--its accomplishment in one's own life is even more so. Our research to date has revealed four different, but related, notions all of which are elements in the larger construct of integration and each of which is implicated in the psycho-social happenings of the mid-life transition.

1. Toward Balance of Life Investments. A well-lived life (as the philosophers down the ages have said) has many parts and each receives its proper time and attention, but more importantly, they are held in balance. The Eastern oriented concept of the ying and yang--opposites, but together forming a perfect circle--conveys this notion. Their emphasis on the Golden Mean, on the importance of not deviating too far toward any extreme carries it as well.

We speak of the "well-rounded" life or person in complimentary terms. Life offers many dimensions of self-actualization and fulfillment as well as diverse responsibilities for the common good.

The specialization of early adulthood concentrates time and energy on one or two limited areas and restricts involvement in others. Career development takes the lion's share, with family taking a (sometimes close, sometimes distant) second place. As was found in Figure 7-1, men and women in mid-life pose as ideal a relative balance of investments between career, family, relationships and self, but report a decidedly lopsided pattern in the early years. By mid-life, they show a better balance, but not yet ideal. The second study showed a similar one-sided concern with career development in early adulthood, but more nearly equal concerns with that and family, self, and generativity in the later years (see Figure 7-2). During the mid-life transition the emphasis shifts somewhat away from career and more toward family and self. Family in particular takes on great importance at that time because it is a center of both responsibility and potential fulfillment that has all too often received less attention than is its due in the middle years. Figures 7-3 and 7-4 give further evidence that people in mid-life begin to address those issues which have been formerly suppressed.

2. Toward the Incorporation of the "Shadow Self." Jung's (1923) treatment of psychological types is predicated on the tendency for each of us to rely more heavily on certain psychological functions than on others in our dealings with self and world. Some functions become dominant and control our perception, awareness, and behavior, while others go underused and underdeveloped. Jung gives to the latter the term "shadow self." This basic notion is also central to our treatment of adaptive styles.

Jung also introduced the concept of a mid-life transition. As one approaches 40, according to him, the non-dominant functions and the potential satisfactions associated with them, i.e., the shadow self, press for expression. Personal growth, according to him, is the process of incorporating all the functions and using them appropriately in the pursuit of various life tasks.

Several of the results reported above bear on this issue. For example, in Figure 7-3 we find that it is those people whose adaptive styles are least oriented to interpersonal relations and emotional closeness (the Comprehension styles) who report, in the mid-life transition and post-transition periods, that developing a good family life is the most important issue they face. Similarly, those whose dominant style is Intension oriented, and therefore tend to be most concerned about self, increase their attention to role oriented issues in mid-life, while the more role-oriented people (those with Extension styles) show increase in their concerns about self oriented issues in mid-life. These findings and others make clear that the mid-life transition is a time for grappling with the rether sides of life--those less attended to in earlier years. Those issues that are best addressed by the non-dominant adaptive processes come into sharper awareness in the early 40's and take their place on one's personal agenda.

We have only begun our analysis of the development of higher order styles, but the early findings there are promising as well. For example, social workers in their early 40's, rely equally on all four adaptive modes, whereas those in other ages rely most heavily on the Apprehension and Extension modes. While further analysis is needed, it appears that as people advance through the adult stages, their adaptive styles become broader: More use is made of all four modes, particularly of the Intension orientation.

3. Toward Harmonious Life Structure. For a great many people, the strongest sense of a lack of integration derives from the inherent conflicts and disjointed nature of their life structures. Competing demands of various contexts (e.g., home versus work) often not only call for different kinds of adaptation in each, but in concert make one feel divided against him or herself. The more obvious conflicts can be managed to some extent by isolating the contexts. Thus many professionals refuse to bring clients or tenuous colleagues into the home. But isolation seldom brings a sense of wholeness.

Most people in mid-life seem to experience a tension between complexity of life structure and its multiple offerings versus the desire for a simple, flowing life. The oft repeated fantasy of throwing it all away and buying a farm or retiring to Tahiti or opening a craft shop comes from being fed up with managing (or mismanaging) a life that is too busy, too taxing, too conflictual to even realize the enjoyments that are offered. How can one be one person and still be involved in everything? On the other hand, those who have been hemmed in by a unidimensional focus feel like they are in a rut. They are seeking new excitements and outlets. To be only one thing is to be nothing--other than bored. As one particularly mature and capable woman put it, "I'm interested in lots of things and I'm involved in lots of settings, but I want to be the same person in all of them."

4. Toward Personal Centeredness. We reported earlier the finding that people tend to be outer-directed in early adulthood, and that that is adaptive for many developmental tasks of the early years. But the excessive attending to other's needs, to organizational requirements, and to all the "shoulds" and "oughts" of society result in a loss of sense of self. In mid-life the urge is strong to shut out the external pressures and attend to one's own needs and purposes. Indeed, one cannot take full responsibility for oneself if these issues are fully denied. A fully functioning person operates out from a center within him/herself. Knowing one's stake in the situation and choosing one's direction is essential to a sense of integration. It also tends to make one more responsive to others. The transition toward inner-directedness is one of the major signs of growth in mid-life.

As we now view the situation, a great deal of energy, activity and reflection is directed toward integration during the mid-life transition. Paradoxically, this often takes one toward another kind of imbalance for a time. It is often temporarily disruptive to harmony in life structure. And very often one feels anything but centered and in control of things. Nonetheless, it is these experiences which eventually move one toward integration.

Our research also indicates that substantial progress is made during the 40's. On all four dimensions of integration, professionals in the post-transition period show more of it than those in earlier stages. Nonetheless, we find relatively few people who have attained a durable integrated state. We suspect that only comes later in life.

BIBLIOGRAPHY

Altemeyer, L. "Education in the Arts and Sciences." Unpublished Ph.D dissertation, Carnegie Mellon University, 1966.

Baltes, P.B.; Reese, H.W.; and Lipsitt, L.P. "Life-Span Developmental Psychology." Annual Review of Psychology, 31, 1980.

Baltes, J.B., and Schaie, K.W. (eds.). Life-Span Developmental Psychology: Personality and Socialization. New York: Academic Press, 1973.

Bensman, J., and Lilienfeld, R. Craft and Consciousness: Occupational Techniques and the development of World Images. New York: Wiley-Interscience Publications, John Wiley and Sons, Inc., 1973.

Berger, P.O., and Luckmann, T. The Social Construction of Reality. Garden City, New York: Doubleday and Company, 1967.

Biglan, A. "The Characteristics of Subject Matter in Different Academic Areas." Journal of Applied Psychology, 57, 1973.

Bledstein, B.G. The Culture of Professionalism: The Middle Class and the Development of Higher Education in America. New York: W.W. Norton and Company, 1976.

Bronfenbrenner, U. "Toward an Experimental Ecology of Human Development." American Psychologist, 1977.

Bruner, J. Beyond the Information Given. New York: Norton, 1973.

Bruner, J. Essays for the Left Hand. New York: Antheneum, 1966.

Bruner, J. The Process of Education. New York: Vintage Books, 1960.

Bushe, G.R. "Toward an Understanding of Accentuation of Learning Styles in College." Unpublished manuscript, Case Western Reserve University, 1981.

Calder, Nigel. The Mind of Man. New York: Viking Press, 1970.

Campbell, D.T., and Stanley, J.C. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally, 1963.

Clark, Diana, et al. "A Study of the Adequacy of the Learning Environment for Business Students in Hawaii in the Fields of Accounting and Marketing." Working Paper, University of Hawaii School of Management, 1977.

Cofer, C.N., and Appley, M.H. Motivation. New York: Wiley and Sons, 1964.

Cohen, M.R., and Nagel, E. An Introduction to Logic and Scientific Method. New York: Harcourt, Brace and World, 1934.

Crary, Marcy. "Assessment of Patterns of Life Structure." Unpublished manuscript, Case Western Reserve University, 1980.

Cronbach, L.J. "Beyond Two Disciplines of Scientific Psychology." American Psychologist, 30, 1975.

Cronbach, L.J., and Snow, R.E. Aptitudes and Instructional Methods. New York: Irvington, 1977.

Davis, J.A. Elementary Survey Analysis. Englewood Cliffs, New Jersey: Prentice Hall, 1971.

Davis, J.A. Undergraduate Career Decisions. Chicago: Aldine Publishing, 1965.

Davis, L.E., and Taylor, J.C. Design of Jobs. Great Britain: Penguin Books, 1972.

Dubin, R. "Theory Building in Applied Areas." Handbook of Industrial and Organizational Psychology. Edited by M.D. Dunnette. Chicago: Rand McNally, 1976.

Dunnette, M.D. "Aptitudes, Abilities and Skills." Handbook of Industrial and Organizational Psychology. Edited by M.D. Dunnette. Chicago: Rand McNally, 1976.

Erikson, Erik H. Childhood and Society. New York: W.W. Norton and Company, 1950.

Erikson, Erik. "Identity and the Life Cycle." Psychological Issues, 1(1), 1959.

Faunce, W.A., and Dubin, R. "Individual Incestment in Working and Living." The Quality of Working Life: Problems, Prospects and the State of the Art, Vol. I. London: Collier Macmillan, 1975.

Feldman, Kenneth, and Newcombe, Theodore. The Impact of College on Students. San Francisco: Jossey-Bass, Vols. 1 and 2, 1969.

Feldman, Kenneth, and Newcombe, Theodore. The Impact of College on Students: Summary Tables. San Francisco: Jossey-Bass, 1973.

Feldman, S. Escape from the Doll's House. New York: McGraw Hill, 1974.

Festinger, Leon. A Theory of Cognitive Dissonance. Stanford, California: Stanford University Press, 1957.

Fishbein, Martin, and Ajzen, Icek. Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research. Reading, Massachusetts: Addison-Wesley Publishing Company, 1975.

Florman, S.C. The Existential Pleasures of Engineering. New York: St. Martin's Press, 1976.

Forehand, G.A., and Gilmer, B. von H. "Environmental Variables in Studies of Organizational Behavior." Psychological Bulletin, 62, 1964.

Freire, Paulo. Education for Critical Consciousness. New York: The Seabury Press, 1973.

Freire, Paulo. Pedagogy of the Oppressed. New York: The Seabury Press, 1970.

French, J.R.P.; Rodgers, W.; and Cobb, S. "Adjustment as Person-Environment Fit." Coping and Adaptation. Edited by Coelho, Hamburg, and Adams. New York: Basic Books, 1974.

Fry, R.E. "Diagnosing Professional Learning Environments: An Observational Framework for Assessing Situational Complexity." Unpublished Ph.D dissertation. Massachusetts Institute of Technology, 1978.

Fry, R.E., and Kolb, D.A. "Experiential Learning Theory and Learning Experiences in Liberal Arts Education." New Directions for Experiential Learning, 6, 1979.

Gendlin, E.T.; Beebe, J.; Cassens, J.; Klein, M.; and Oberlander, M. "Focusing Ability in Psychotherapy, Personality, and Creativity." Research in Psychotherapy. Edited by J.M. Schlein. Washington, D.C.: American Psychological Association, 1968.

Ginsberg, E. "Toward a Theory of Occupational Choice: A Restatement." Vocational Guidance Quarterly, March, 1972.

Ginsburg, Herbert, and Opper, Sylvia. Piaget's Theory of Intellectual Development. Englewood Cliffs, New Jersey: Prentice Hall Publishing Company, 1969.

Gish, Glen. "Adult Development and Adaptive Flexibility: An Empirical Test of Experiential Learning Theory." Unpublished Ph.D dissertation, Case Western Reserve University, 1980.

Gish, Glen. "Integrated Learning: A Process Model." Unpublished qualifying paper, Case Western Reserve University, 1979.

Glaser, B.G., and Strauss, A.L. The Discovery of Grounded Theory: Strategies for Qualitative Research. Chicago: Aldine Publishing Company, 1967.

Goffman, Erving. The Presentation of Self in Everyday Life. New York: Doubleday and Company, 1959.

Goldstein, K., and Scheerer, M. "Abstract and Concrete Behavior: An Experimental Study with Special Tests." Psychological Monographs, 53, 1941.

Gould, R.L. "The Phases of Adult Life: A Study in Developmental Psychology." American Journal of Psychiatry, 129, November, 1972.

Graham, Douglas. Moral Learning and Development: Theory and Research. New York: Wiley and Sons, 1972.

Griggs, Walter H. "On the Measurement of the Learning Press of Technical Work Environments." Unpublished Ph.D dissertation, Case Western Reserve University, Cleveland, Ohio 1980.

Grochow, J. "Cognitive Style as a Factor in the Design of Interactive Decision-Support Systems." Unpublished Ph.D dissertation, Massachusetts Institute of Technology, 1973.

Guilford, J.P. *Psychometric Methods*. New York: McGraw Hill, 1954.

Gypen, J. "Engineering Alumni of Case Institute of Technology: A Profile." Unpublished qualifying paper, Case Western Reserve University, 1979.

Gypen, J. "Learning Style Adaptation in Professional Careers: The Case of Engineers and Social Workers." Unpublished Ph.D dissertation, Case Western Reserve University, 1981.

Hackman, J.R., and Lawler, E.E. "Employee Reactions to Job Characteristics." *Journal of Applied Psychology*, Monograph 55, 1971.

Hackman, J.R., and Oldham, G.R. "Development of the Job Diagnostic Survey." *Journal of Applied Psychology*, *60*, 1975.

Hackman, J.R., and Oldham, G.R. *Work Redesign*. Reading, Massachusetts, 1980.

Harvey, O.J. (ed.) *Experience, Structure, and Adaptability*. New York: Springer Publishing Company, Inc., 1966.

Harvey, O.J.; Hunt, D.E.; and Schroder, H.M. *Conceptual Systems and Personality Organization*. New York: Wiley and Sons, Inc., 1961.

Havighurst, Robert. "The Life Cycle." *The Modern American College*. Edited by A. Chickering. San Francisco: Jossey-Bass, 1981.

Heath, Douglas. "High Marks Seen as No Guarantee of Later Success." *New York Times* June 5, 1977.

Helson, Harry. *Adaptation-Level Theory: An Experimental and Systematic Approach to Behavior*. New York: Harper and Row, 1964.

Herzberg, F. *Work and the Nature of Man*. Cleveland, Ohio: World Publishing, 1966.

Holland, J.L. *Making Vocational Choices: A Theory of Careers*. Englewood Cliffs, New Jersey, 1973.

Holland, J.L. *The Psychology of Vocational Choice: A Theory of Personality Types and Environmental Models*. London: Ginn, 1966.

Holland, J.L. "Student Explanations of College Choices and Their Relation to College Popularity, College Productivity and Sex Differences." *College and University*, *33*, 1958.

Hudson, Liam. *Contrary Imaginations*. Middlesex, England: Penguin Books, 1966.

Hulin, G.L., and Blood, M.C. "Job Enlargement, Individual Differences, and Worker Responses." Psychological Bulletin, 69, 1968.

Hunt, D.E. Matching Models in Education: The Coordination of Teaching Methods with Student Characteristics. Monograph Series No. 10, Ontario Institute of Technology, 1971.

Hunt, D.E. "Person-Environment Interaction: A Challenge Found Wanting Before It was Tried." Address to Division of Educational Psychological Association, Montreal, Quebec, August, 1973.

Hunt, J. McU. "Traditional Personality Theory in Light of Recent Evidence." American Scientist, 53, 1965.

Huntley, C.W. "Changes in Study of Value Scores During Four Years of College." Genetic Psychology Monographs, 71.

Ivancevich, J.M., and Matteson, M.T. "Optimizing Human Resources: A Case for Preventive Health and Stress Management." Organizational Dynamics, 1980, Autumn.

Jaffe, A.J. The Middle Years: Neither Too Young Nor Old. National Council on Aging, Washington, D.C., 1971.

Jenks, Christopher, et al. The Economic Determinants of Success in America. New York: Basic Books, 1979.

Joyce, B., and Weil, M. Models of Teaching. New Jersey: Prentice-Hall, 1972.

Jung, C.G. Psychological Types. Princeton, New Jersey: Princeton University Press, 1971.

Kagan, J., and Kogan, N. "Individual Variations in Cognitive Processes." Carmichael's Manual of Child Psychology, Vol. 1. Edited by Ph.H. Musser. New York: Wiley and Sons, 1970.

Kagan, Jerome; Rosman, Bernice L.: Day, Deborah; Alpert, Joseph; and Phillips, William. "Information Processing in the Child: Significance of Analytic and Reflective Attitudes." Psychological Monographs, 78(1).

Kahana, E. "A Congruence Model of Person-Environment Interaction." Theory Development in Environment and Aging. Edited by P.G. Windley, et al. Gerontological Society, 1975.

Kahn, R.L.; Wolfe, D.M.; Quinn, R.P.; Snoek, J.D.; and Rosenthal, R.A. Organizational Stress. New York: Wiley and Sons, 1964.

Kaplan, Abraham. The Conduct of Inquiry: Methodology for Behavioral Science. Scranton, Pennsylvania: Chandler, 1964.

Kelly, George A. The Psychology of Personal Constructs. New York: Norton, 1955.

Kerlinger, Fred N. Foundations of Behavioral Research. New York: Holt, Rinehart, and Winston, 1973.

Kirby, Patricia. Cognitive Style, Learning Style, and Transfer Skill Acquisition. Columbus, Ohio: National Center for Vocational Education, 1979.

Koffka, K. Principles of Gestalt Psychology. New York: Harcourt Brace, 1935.

Kohlberg, L. "Stage and Sequence: The Cognitive-Developmental Approach to Socialization." Handbook of Socialization Theory and Research. Edited by D.A. Goslin. Chicago: Rand McNally, 1969.

Kolb, David A. "A Cybernetic Model of Human Change and Growth." Working Paper, Massachusetts Institute of Technology, Alfred P. Sloan School of Management, 1971.

Kolb, David A. "Individual Learning Styles and the Learning Process." Working Paper, Massachusetts Institute of Technology, Alfred P. Sloan School of Management, 1971.

Kolb, David A. The Learning Style Inventory: Technical Manual. Boston, Massachusetts: McBer and Company, 1976.

Kolb, David A. "On Management and the Learning Process." Working Paper, Massachusetts Institute of Technology, Alfred P. Sloan School of Management, 1973.

Kolb, David A. (co-principal investigator). "Professional Education and Career Development in Social Work and Engineering: A Cross-Sectional Study of Adaptive Competencies in Experiential Learning." Research Grant Funded by the National Institute of Education: Grant # NIE G 770053, 1979.

Kolb, David A. "Toward a Typology of Learning Styles and Learning Environments: An Investigation of the Impact of Learning Styles and Discipline Demands on the Academic Performance, Social Adaptation and Career Choices of MIT Seniors." Working Paper, Massachusetts Institute of Technology, Alfred P. Sloan School of Management, 1973.

Kolb, David A., and Fry, Ronald E. "Toward an Applied Theory of Experiential Learning." Theories of Group Processes. Edited by C. Cooper. London: Wiley and Sons, 1975.

Kolb, David A., and Goldman, M. "Toward a Typology of Learning Styles and Learning Environments." Working Paper, Massachusetts Institute of Technology, Alfred P. Sloan School of Management, 1973.

Kolb, David A., and Plovnick, M.S. "The Experiential Learning Theory of Career Development." New Perspectives on Organizational Careers. Edited by J. Van Mannen. New York: John Wiley and Sons, 1976.

Kolb, David A. "Learning Styles and Disciplinary Differences." Chapter 10 in A. Chickering (Ed.) The Modern American College. San Francisco: Jossey Bass, 1981.

Kolb, David A. "Experiential Learning Theory and the Learning Style Inventory: A Reply to Freedman and Stumpf." Academy of Management Review. April, 1981.

Kolb, David A.; Rubin, Irwin M.; McIntyre, James M. Organizational Psychology: A Book of Readings (2nd ed.). New Jersey: Prentice-Hall, 1972.

Kris, E. Psychoanalytic Explorations in Art. New York: International Universities Press, 1952.

Kuhn, T. The Structure of Scientific Revolutions. Chicago: University of Chicago Press, 1962.

Lawrence, P.R., and Lorsch, J.W. Organization Environment. Homewood, Illinois: Richard D. Irwin, Inc., 1969.

Lawrence, P.R., and Lorsch, J.W. "Organization and Environment: Managing Differentiation and Integration." Division of Research, Harvard Business School, 1967.

Lawton, M.P. "Competence, Environmental Press and the Adaptation of Older People." P.G. Windley, et al. (eds.), 1975.

Levinson, Daniel. "The Mid-Life Transition: A Period in Adult Psycho-Social Development." Psychiatry, May, 1977.

Levinson, Daniel. The Seasons of a Man's Life. New York: Alfred A. Knopf, 1978.

Lewin, Kurt. A Dynamic Theory of Personality. New York: McGraw Hill, 1935.

Lewin, Kurt. Field Theory in Social Science. New York: Harper and Row, 1951.

Lewin, Kurt. "Group Decision and Social Change." Readings in Social Psychology. Edited by E.E. Maccoby, T.M. Newcombe, and E.L. Hartley. New York: Holt-Rinehart, 1947.

Lewin, K. Principles of Topological Psychology. New York: McGraw-Hill Book Company, 1936.

Loevinger, Jane. Ego Development: Conceptions and Theories. San Francisco: Jossey-Bass, 1976.

Loevinger, Jane, and Wessler, Ruth. Measuring Ego Development, Vol. 1. San Francisco: Jossey-Bass, 1978.

Magnusson, D., and Endler, N.S. "Interaction Psychology: Present Status and Future Prospects." Personality at the Crossroads. Edited by D. Magnusson, 1977.

Manring, Susan. "Career Patterns of Technically-Trained Professionals: A Person-Environment Interaction Model." Unpublished Ph.D dissertation, Case Western Reserve University, 1980.

Maslow, A.H. The Farther Reaches of Human Nature. New York: The Viking Press, 1971.

Maslow, A.H. Motivation and Personality. New York: Harcourt, Brace, and World, 1963.

Maslow, A.H. Toward a Psychology of Being. Princeton, New Jersey: D. Van Nostrand, 1962.

McClelland, D.C. "On the Psychodynamics of Creative Physical Scientists." Contemporary Approaches to Creative Thinking. Edited by H.E. Gruber, et al. New York: Atherton, 1962.

McConnell, T.R. "The Vocational College Culture." Orientation to College Learning: A Reappraisal. Edited by N.C. Brown. Washington, D.C.: American Council on Education, 1961.

McFee, A. "The Relation of Students' Needs to Their Perceptions of a College [illegible]." Journal of Educational Psychology, 52, 1961.

McKinlay, B. "Characteristics of Jobs that are Considered Common: Review of Literature and Research." Columbus, Ohio: The Center for Vocational Education, 1976.

McLachlan, H.F.C. "Individual Differences and Teaching Methods in Student Interpretation of Modern Art." Unpublished Master's thesis, University of Toronto, 1969.

McMurry, P.N. "Recruitment, Dependence, and Morale in the Banking Industry." Administrative Science Quarterly, 3, 1958.

Meyer, Henry J. "Sociological Comments." Non-Professionals in the Human Services. Edited by Charles Grosser, et al. San Francisco: Jossey-Bass, 1969.

Miller, Chris W. "The Effects of Work Experience and Undergraduate Education on the Learning Style and Career Development of Technical Professionals." Unpublished Ph.D dissertation, Case Western Reserve University, 1978.

Mischel, Walter. "On the Interface of Cognition and Personality: Beyond the Person-Situation Debate." American Psychologist, 34(9), 1974.

Mitchell, T.R. People in Organizations: Understanding their Behavior. New York: McGraw-Hill, 1978.

Mitroff, I.I. The Subjective Side of Science: An Inquiry into the Psychology of the Apollo Moon Scientists. Amsterdam: Elsavier, 1974.

Mitroff, I.I., and Kilmann, R.H. "Stories Managers Tell: A New Tool for Organizational Problem Solving." Management Review, 1975.

Morse, J.J. "Organizational Characteristics and Individual Motivation." Studies in Organization Design. Edited by J.W. Lorsch and P.R. Lawrence. Homewood, Illinois: Irwin-Dorsey, 1970.

Morse, J.J. "Person-Job Congruence and Individual Adjustment and Development." *Human Relations*, *26*, 1973.

Murray, H.A. (ed.) *Explorations in Personality*. New York: Oxford, 1938.

Myers-Briggs, I. *The Myers-Briggs Type Indicator Manual*. Princeton, New Jersey: Educational Testing Service, 1962.

Nadler, D.A., and Tushman, M.L. "A Model for Diagnosing Organizational Behavior." *Organizational Dynamics*, Autumn, 1980.

Neimroff, P., and Ford, D.L. "Task Effectiveness and Human Fulfillment in Organizations: A Review and Development of a Conceptual Contingency Model." *Academy of Management Review*, *1*, 1976.

Nelson, E.N. "Radicalism-Conservatism in Student Attitudes." *Psychological Monographs*, *22*, 1940.

Nelson, E.N. "Student Attitudes Toward Religion." *Genetic Psychological Monographs*, *22*, 1940.

Nesselroade, J.R., and Reese, H.W. (eds.). *Life-Span Developmental Psychology: Methodological Issues*. New York: Academic Press, 1973.

Neugarten, Bernice (ed.). *Middle Age and Aging*. Chicago: University of Chicago Press, 1968.

O'Reilly, C.A. "Personality-Job Fit: Implications for Individual Attitudes and Performance." *Organizational Behavior and Human Performance*, *18*, 1977.

Osgood, C.E.; Suci, G.J.; and Tannenbaum, P.H. *The Measurement of Meaning*. Chicago: University of Illinois, 1957.

Osipow, S.H. *Theories of Career Development*. New York: Appleton-Century-Crofts, 1968.

Pace, C.R. *The Influence of Academic and Student Subcultures in College and University Environments*. Los Angeles: UCLA, 1964.

Pace, C.R., and Stern, G.G. "An Approach to the Measurement of Psychological Characteristics of College Environments." *Journal of Educational Psychology*, *45*, 1958.

Pazy, Asya. "Variability in Self Experience: Developmental and Circumstantial Perspectives." Unpublished Ph.D dissertation, Case Western Reserve University, 1979.

Pepper, Stephen C. *Concept and Quality: A World Hypothesis*. LaSalle, Illinois: Open Court Publishing Company, 1966.

Pepper, Stephen. World Hypotheses. Berkeley, California: University of California Press, 1942.

Perry, W.G., Jr. Forms of Intellectual and Ethical Development in the College Years. New York: Holt, Rinehart, and Winston, 1970.

Pervin, L.A. "Performance and Satisfaction as a Function of Individual-Environment Fit." Psychological Bulletin, 69, 1968.

Piaget, Jean. The Place of the Sciences of Man in the System of Sciences. New York: Harper Torch Books, 1970.

Piaget, J. Structuralism. New York: Harper Torchbooks, 1968.

Plovnick, Mark S. "A Cognitive Theory of Occupational Role." Working Paper, Massachusetts Institute of Technology, Sloan School of Management, 1972.

Plovnick, Mark S. "Individual Learning Styles and the Process of Career Choice in Medical Students." Unpublished Ph.D dissertation, Massachusetts Institute of Technology.

Plovnick, Mark S. "Primary Care Career Choices and Medical Student Learning Styles. Journal of Medical Education, 50, September, 1975.

Plovnick, Mark S. "Social Awareness and Role Innovation in Engineers." Working Paper, Massachusetts Institute of Technology, Sloan School of Management, 1972.

Polyani, Michael. Personal Knowledge. New York: Harper Torch Books, 1958.

Polanyi, Michael. The Study of Man. Chicago: The University of Chicago Press, 1958.

Roe, Anne. The Psychology of Occupations. New York: Wiley and Sons, 1956.

Rogers, Carl R. On Becoming a Person. Boston: Houghton Mifflin, 1961.

Romano, John (ed.). Adaptation. Ithaca, New York: Cornell University Press, 1949.

Schein, Edgar. Career Dynamics: Matching Individual and Organization Needs. Reading, Massachusetts: Addison-Wesley, 1978.

Schein, Edgar. "Organizational Socialization in the Early Career of Industrial Managers." Working Paper, Massachusetts Institute of Technology, Sloan School of Management, 1963.

Schein, Edgar. Professional Education. New York: McGraw Hill, 1972.

Schroder, H.M.; Driver, M.J.; and Streufert, S. Human Information Processing. New York: Holt, Rinehart and Winston, Inc., 1967.

Seybolt, J.N. "The Impact of Work Role Design on Career Satisfaction." Work, Family and the Career. Edited by C.B. Derr. New York: Praeger Publishing Company, 1980.

Sheehy, Gail. Passages. New York: E.P. Dutton, 1976.

Simon, H. The Sciences of the Artificial. Cambridge, Massachusetts: Massachusetts Institute of Technology, 1969.

Sims, H.P.; Szilagyi, A.D.; and Keller, R.T. "The Measurement of Job Characteristics." Academy of Management Journal, 19, 1976.

Sims, Ronald R. "Assessing Competencies in Experiential Learning Theory: A Person-Job Congruence Model of Effectiveness in Professional Careers." Unpublished Ph.D dissertation, Case Western Reserve University, 1981.

Sims, Ronald R. "Preparation for Professional Jobs and Changing Career Roles: An Assessment of Professional Education." Unpublished manuscript, Case Western Reserve University, 1980.

Singer, Jerome. "The Importance of Daydreaming." Psychology Today, 1(11), 1968.

Snow, C. The Two Cultures: On a Second Look. England: Cambridge University Press, 1963.

Sofer, Cyril. Men in Mid-Career. Cambridge: Cambridge University Press, 1970.

Stabell, C. "The Impact of a Conversational Computer System on Human Development Perspective." Unpublished Master's thesis, Massachusetts Institute of Technology, Sloan School of Management, 1973.

Stern, G.G. "Continuity and Contrast in the Transition from High School to College." N.C. Brown (ed.), 1961.

Stern, G.G. People in Context. New York: Wiley and Sons, 1970.

Strasmore, M. "The Strategic Function Reevaluated from the Organization Development Perspective." Unpublished Master's thesis, Massachusetts Institute of Technology, Sloan School of Management, 1973.

Super, D., et al. Career Development Self Concept Theory. Princeton, New Jersey: Princeton College Entrance Exam Board, 1963.

Suttle, J.L. Improving Life at Work: Behavioral Science Approaches to Organizational Change. Goodyear Publishing Company, Inc., 1977.

Thistlethwaite, D.W. "College Press and Changes in the Study Plans of Talented Students." Journal of Education Psychology, 51, 1960.

Thistlethwaite, D.L. "College Press and Student Achievement." Journal of Educational Psychology, 50, 1959.

Thompson, P.H. "Who Gets Laid Off?" IEEE Spectrum, 10, 1973.

Tomlinson, P.D. "Differential Effectiveness of Three Teaching Strategies for Students of Varying Conceptual Levels." Unpublished Master's thesis, University of Toronto, 1969.

Torbert, W.R. Learning from Experience: Toward Consciousness. New York: Columbia University Press, 1972.

Torrealba, D. "Convergent and Divergent Learning Styles." Unpublished Master's thesis, Massachusetts Institute of Technology, Sloan School of Management, 1972.

Tuckman, B.W. "A Study of the Effectivness of Directive versus Non-Directive Vocational Teachers as a Function of Student Characteristics and Course Format." Washington, D.C.: Final Report, U.S. Office of Education, 1968.

Turner, A.N., and Lawrence, P.R. Industrial Jobs and the Worker. Cambridge: Harvard Graduate School of Business Administration, 1965.

Van Maanen, J., and Schein, E.H. "Career Development." Improving Life at Work: Behavioral Science Approaches to Organizational Change. Edited by J. Richard Hackman and J. Lloyd Suttle. Santa Monica, California: Goodyear Publishing Company, Inc., 1977.

Veblen, T. The Theory of the Leisure Class. New York: Modern Library, 1934.

Veysey, L. "Stability and Experiment in the American Undergraduate Curriculum." Content and Context. New York: McGraw Hill, 1973.

Vickers, G. Value Systems and Social Process. Great Britain: Pelican Books, 1968.

Walsh, W.B. "Theories of Person-Environment Interaction: Implications for the College Student." Iowa City: American College Testing Program, 1973.

Watts, Alan W. The Two Hands of God: The Myths of Polarity. New York: The Macmillan Company, 1963.

Webster's New World Dictionary. New York: World Publishing, 1964.

Werner, Heinz. "The Concept of Development from a Comparative and Organismic Point of View." The Concept of Development. Edited by D.B. Harris. Minneapolis: Minnesota: University of Minnesota Press, 1957.

White, Robert. "Motivation Reconsidered: The Concept of Competence." Psychological Review, 66, 1959.

Witkin, Herman. "The Role of Cognitive Style on Academic Performance and in Teacher/Student Relationships." *Research Bulletin*, *73*-11. ETS: Princeton, New Jersey.

Witkin, Herman, et al. *Personality Through Perception*. New York: Harper, 1954.

Witkin, Herman, et al. *Psychological Differentiation*. New York: Wiley, 1962.

Witkin, Herman; Goodenough, D.P.; and Cox, F.W. "Field-Dependent and Field-Independent Cognitive Styles and their Educational Implications." *Review of Educational Research*, *47*, Winter, 1977.

Witkin, Herman; Oltman, Philip; Raskin, Evelyn; and Karp, Stephen. *A Manual for the Embedded Figures Test*. Palo Alto, California: Consulting Psychologists Press, Inc., 1971.

Wolfe, Donald M., and Kolb, David A. "Beyond Specialization: The Quest for Integration in Midcareer." *Work, Family and the Career: New Frontiers in Theory and Research*. Edited by Brooklyn Derr. New York: Praeger Publishers, 1980.

Wolfe, Donald M., and Kolb, David A. "Career Development, Personal Growth and Experiential Learning." *Organizational Psychology: A Book of Readings* (3rd ed.). Edited by David A. Kolb; Irwin M. Rubin; and James M. McIntyre. New Jersey: Prentice-Hall, 1979.

Wolfe, Donald M., and Kolb, David A. "Learning Processes in Adult Development: A Study of Cognitive and Social Factors in Midlife Transition." Research Project sponsored by the Spencer Foundation, Case Western Reserve University, 1977-'81.

Wylie, Ruth. *The Self Concept: A Critical Survey of Pertinent Research Literature* (revised ed.). Lincoln, Nebraska: University of Nebraska Press, 1974.

APPENDIX A

THE ALUMNI SURVEY QUESTIONNAIRE

SURVEY OF
PROFESSIONAL EDUCATION AND CAREER DEVELOPMENT

SURVEY OF
PROFESSIONAL EDUCATION AND CAREER DEVELOPMENT

WORK EXPERIENCE

1. Present job: What is the full title of your job? ______________________
(If you have more than one job, record the one that is most central to you.)
Please describe the functions in this job: ______________________
____
How long have you held this job? _____ How long do you think you will remain with this organization? _____

Using the enclosed yellow sheet, please describe as well as you can the following characteristics of your present job. Look over the indicated list and write the appropriate number or numbers in the space provided.

Type of Organization: (List A) _____
Location: (List B) _____
Job description(s): (List C) _____

Number of people working for you: _______

Present salary: (please circle one number)

10,000 or less	1	10,000-20,000	2
20,000-30,000	3	30,000-40,000	4
40,000-50,000	5	50,000 or more	6

2. Current job characteristics: (circle the appropriate number for each item in terms of how much the statement is descriptive of your current work situation)

	Not at all characteristic					Very characteristic	
a. Identifying problems to work on	1	2	3	4	5	6	7
b. Planning for your office	1	2	3	4	5	6	7
c. Building conceptual models	1	2	3	4	5	6	7
d. Committing yourself to objectives	1	2	3	4	5	6	7
e. Creating new ways of thinking and doing	1	2	3	4	5	6	7
f. Making decisions	1	2	3	4	5	6	7
g. Designing experiments	1	2	3	4	5	6	7
h. Being sensitive to values	1	2	3	4	5	6	7
i. Establishing criteria for work quality	1	2	3	4	5	6	7
j. Generating alternative ways of doing things	1	2	3	4	5	6	7
k. Organizing information	1	2	3	4	5	6	7
l. Setting goals	1	2	3	4	5	6	7
m. Experimenting with new ideas and approaches	1	2	3	4	5	6	7
n. Identifying opportunities to pursue	1	2	3	4	5	6	7
o. Defining and clarifying problems	1	2	3	4	5	6	7
p. Dealing with people	1	2	3	4	5	6	7
q. Gathering information	1	2	3	4	5	6	7
r. Seeking and exploiting opportunities	1	2	3	4	5	6	7
s. Evaluating programs and people	1	2	3	4	5	6	7
t. Analyzing quantitative data	1	2	3	4	5	6	7
u. Being sensitive to people's feelings	1	2	3	4	5	6	7
v. Being personally involved	1	2	3	4	5	6	7
w. Testing theories and ideas	1	2	3	4	5	6	7
x. Measuring the performance of people and programs	1	2	3	4	5	6	7

3. Ideal job characteristics: (circle the appropriate number for each item in terms of how much the statement is descriptive of the ideal job you would like to be doing)

		Not at all characteristic					Very characteristic	
a.	Identifying problems to work on	1	2	3	4	5	6	7
b.	Planning for your office.	1	2	3	4	5	6	7
c.	Building conceptual models.	1	2	3	4	5	6	7
d.	Committing yourself to objectives	1	2	3	4	5	6	7
e.	Creating new ways of thinking and doing	1	2	3	4	5	6	7
f.	Making decisions.	1	2	3	4	5	6	7
g.	Designing experiments	1	2	3	4	5	6	7
h.	Being sensitive to values	1	2	3	4	5	6	7
i.	Establishing criteria for work quality.	1	2	3	4	5	6	7
j.	Generating alternative ways of doing things . .	1	2	3	4	5	6	7
k.	Organizing information.	1	2	3	4	5	6	7
l.	Setting goals	1	2	3	4	5	6	7
m.	Experimenting with new ideas and approaches . .	1	2	3	4	5	6	7
n.	Identifying opportunities to pursue	1	2	3	4	5	6	7
o.	Defining and clarifying problems.	1	2	3	4	5	6	7
p.	Dealing with people	1	2	3	4	5	6	7
q	Gathering information	1	2	3	4	5	[illegible]	7
r.	Seeking and exploiting opportunities.	1	2	3	4	5	6	7
s	Evaluating programs and people.	1	2	3	4	5	6	7
t.	Analyzing quantitative data	1	2	3	4	5	6	7
u.	Being sensitive to people's feelings.	1	2	3	4	5	6	7
v.	Being personally involved	1	2	3	4	5	6	7
w	Testing theories and ideas.	1	2	3	4	5	6	7
x.	Measuring the performance of people and programs.	1	2	3	4	5	6	7

JOB SATISFACTION AND PERFORMANCE

4. Job satisfaction: (circle the appropriate number for each item)

To what extent are you satisfied in your work with the:

		Dissatisfied					Satisfied	
a.	Nature of the task	1	2	3	4	5	6	7
b.	Value of the service	1	2	3	4	5	6	7
c.	Quality of supervision	1	2	3	4	5	6	7
d.	Relations with people.	1	2	3	4	5	6	7
e.	Weight of the work load.	1	2	3	4	5	6	7
f.	Opportunities for advancement.	1	2	3	4	5	6	7
g.	Security	1	2	3	4	5	6	7
h.	Freedom to use personal judgment/initiative . .	1	2	3	4	5	6	7
i.	Chance to grow and develop	1	2	3	4	5	6	7
j.	Pay and benefits	1	2	3	4	5	6	7

5. Job performance: (circle the appropriate number for each item)
How do you rate your performance in
your current job in terms of your:

	Inadequate						Adequate
a. Quantity and quality of work	1	2	3	4	5	6	7
b. Commitment and initiative toward the job . . .	1	2	3	4	5	6	7
c. Creativity	1	2	3	4	5	6	7
d. Ability to get along with others	1	2	3	4	5	6	7

6. Importance of work: (please indicate the extent to which you agree with the following statements by circling the appropriate number)

	Strongly disagree						Strongly agree
a. If I had to change the kind of work I do, I would be very frustrated and unfulfilled . .	1	2	3	4	5	6	7
b. I like to think about my work, even when off the job	1	2	3	4	5	6	7
c. My only interest in my job is to get enough money to do the other things I want to do. . .	1	2	3	4	5	6	7
d. I wish I were in a completely different occupation	1	2	3	4	5	6	7
e. My main satisfactions in life come from the work I do.	1	[illegible]	3	4	5	6	7

7. Occupational history: One of the major purposes of this study is to find out what kinds of patterns there are in people's jobs after their professional education. We would like some basic information about each job you have held since college/graduate school at CWRU, and the length of time you held that job. If you have been in your present job since the beginning, check here _____, skip this section, and go to question 8.

A promotion within an organization does not constitute a new job, unless your function changed in some basic way along with the promotion. List only jobs which you have held for six months or more, unless you consider some shorter job of special importance. Space is provided for five jobs (excluding your present one, which you have already described). If you have held more than five jobs before the present one, please describe the first five in the spaces provided and add a sheet which describes the others.

7.1 Initial job after school
Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____
Length of time job was held: _____ Reason(s) for leaving: _____ (List D)

7.2 Second job after school
Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____
Length of time job was held: _____ Reason(s) for leaving: _____ (List D)

7.3 Third job after school
Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____
Length of time job was held: _____ Reason(s) for leaving: _____ (List D)

7.4 Fourth job after school:
Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____
Length of time job was held: _____ Reason(s) for leaving: _____ (List D)

7.5 Fifth job after school:
Type of organization: (List A) _____ Location (List B) _____ Job description(s): (List C) _____
Length of time job was held: _____ Reason(s) for leaving: _____ (List D)

8. Assessment of educational and job experiences: Below is a list of abilities that people possess to varying degrees. We are concerned with the contribution of your CWRU/CIT educational experiences, your post-CWRU/CIT educational experiences and your work experience to the development of these abilities.
Please complete the information requested below for Column A and B before proceeding to the next step. Then, for each of the abilities listed, please indicate in the first column the effect of your CWRU (CIT) education; in the second column indicate the effect of your post-CWRU (CIT) educational experiences; and in the third column indicate the effect of your work experience.

If your education, learning experiences or job experiences contributed positively to the development of these abilities, circle the +2 if they contributed a great deal and the +1 if they contributed only a little. If the extent to which you possess a given ability was not dependent on or is unrelated to your education, learning experiences or job experience, circle the 0. If the given ability was decreased as a result of your education, learning experiences or job experience, circle the -1.

A. Your education at CWRU/CIT (specify degree(s) and field(s), e.g. B.S. Engineering, M.S. Applied Social Science)

B. Post CWRU/CIT learning experiences (List important conferences, work at other universities, self-study, management training programs, intern programs, etc.)

C. Your work experience as specified already in questions 1 and 7.

EFFECT OF →	A. Education at CWRU/CIT				B. Post CWRU/CIT Learning Experience				C. Work Experience			
a. Identifying problems to work on . .	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
b. Planning for your office.	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
c. Building conceptual models.	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
d. Committing yourself to objectives .	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
e. Creating new ways of thinking and doing	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
f. Making decisions.	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
g. Designing experiments	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
h. Being sensitive to values	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
i. Establishing criteria for work quality	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
j. Generating alternative ways of doing things.	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
k. Organizing information.	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
l. Setting goals	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
m. Experimenting with new ideas and approaches.	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
n. Identifying opportunities to pursue	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
o. Defining and clarifying problems. .	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
p. Dealing with people	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
q. Gathering information	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
r. Seeking and exploiting opportunities	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
s. Evaluating programs and people. .	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
t. Analyzing quantitative data	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
u. Being sensitive to people's feelings.	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
v. Being personally involved	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
w. Testing theories and ideas.	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
x. Measuring the performance of people and programs	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2

9. Work abilities: (circle the appropriate number for each item)

At the present time, how would you rate your kind of ability in the following skill areas (whether you use them in your present work or not)?

I am:

	Unskilled			Average		Highly skilled	
a. Identifying problems to work on	1	2	3	4	5	6	7
b. Planning for your office	1	2	3	4	5	6	7
c. Building conceptual models	1	2	3	4	5	6	7
d. Committing yourself to objectives	1	2	3	4	5	6	7
e. Creating new ways of thinking and doing	1	2	3	4	5	6	7
f. Making decisions	1	2	3	4	5	6	7
g Designing experiments	1	2	3	4	5	6	7
h. Being sensitive to values	1	2	3	4	5	6	7
i. Establishing criteria for work quality	1	2	3	4	5	6	7
j. Generating alternative ways of doing things	1	2	3	4	5	6	7
k Organizing information	1	2	3	4	5	6	7
l. Setting goals	1	2	3	4	5	6	7
m. Experimenting with new ideas and approaches	1	2	3	4	5	6	7
n. Identifying opportunities to pursue	1	2	3	4	5	6	7
o. Defining and clarifying problems	1	2	3	4	5	6	7
p. Dealing with people	1	2	3	4	5	6	7
q. Gathering information	1	2	3	4	5	6	7
r. Seeking and exploiting opportunities	1	2	3	4	5	6	7
s. Evaluating programs and people	1	2	3	4	5	6	7
t. Analyzing quantitative data	1	2	3	4	5	6	7
u. Being sensitive to people's feelings	1	2	3	4	5	6	7
v. Being personally involved	1	2	3	4	5	6	7
w. Testing theories and ideas	1	2	3	4	5	6	7
x. Measuring the performance of people and programs	1	2	3	4	5	6	7

LEARNING AND LIFE

10. Learning style: Each person has ways he or she prefers to learn. The following sets of words characterize ways of learning. There are nine sets of four words listed below. Rank order the words in each set by assigning a "4" to the word which best characterizes your learning style, a "3" to the word which next best characterizes your learning style, a "2" to the next most characteristic word, and a "1" to the word which is least characteristic of you as a learner.

You may find it hard to choose the words that best characterize your learning style. Keep in mind that there are no right or wrong answers--all the choices are equally acceptable. The aim is to describe how you learn, not to evaluate your learning ability.

Be sure to assign a different rank number to each of the four words in each set; do not make ties. Be sure to give a "4" rank to the word that is most characteristic of you as a learner.

(See Kolb, 1976)

11. Personal Life Issues: (please circle one number for each statement to indicate how important each issue is at this point in your life)

	Not and/or less important		Somewhat important			Very important A key issue now	
a. Becoming more in touch with my feelings and values	1	2	3	4	5	6	7
b. Becoming my own person with identity and direction, not dependent on anyone else.	1	2	3	4	5	6	7
c. Learning new skills and ideas	1	2	3	4	5	6	7
d. Further developing my specialized knowledge and expertise	1	2	3	4	5	6	7
e. Changing my goals and activities to more realistically reflect who I am and what I want from life. . . .	1	2	3	4	5	6	7
f. Developing a variety of interests . .	1	2	3	4	5	6	7
g. Having more time for myself	1	2	3	4	5	6	7
h. Being successful in my career or occupation.	1	2	3	4	5	6	7
i. Contributing to society	1	2	3	4	5	6	7
j. Having a good family life	1	2	3	4	5	6	7
k. Using my leisure time meaningfully. .	1	2	3	4	5	6	7
l. Sharing my knowledge and skills, contributing to the next generation; being helpful to younger friends and associates.	1	2	3	4	5	6	7
m. Accomplishing a few important things in the finite period I have left. .	1	2	3	4	5	6	7
n. Sharing everyday human joys with others, maintaining warm relationships	1	2	3	4	5	6	7
o. Being a parent, raising my children .	1	2	3	4	5	6	7
p. Maintaining a vital relationship with my mate.	1	2	3	4	5	6	7
q. Achieving my financial and material success goals	1	2	3	4	5	6	7
r. Maintaining my physical health and well-being.	1	2	3	4	5	6	7
s. Living in harmony with my religious beliefs and feelings.	1	2	3	4	5	6	7
t. Coping with stress and pressure . . .	1	2	3	4	5	6	7
u. Dealing with changes in my life . . .	1	2	3	4	5	6	7
v. Contributing to community affairs . .	1	2	3	4	5	6	7
w. Attaining wisdom, seeing the "big picture".	1	2	3	4	5	6	7

12. Current life situation: (check the appropriate response and explain as appropriate)

The statement that most nearly describes your situation at this point in your life is:

_____Not much has changed for me in the last several years.

_____I have just come through a major transition/change period in my life and/or work.

_____I feel like I am on the verge of making a lot of change in my life and/or work.

Please explain your answer briefly ______________________________

13. In retrospect, what has been the best and worst aspects to you about your professional education at Case Western Reserve University?

Best aspects:

Worst aspects:

14. Knowing what you do now, what changes, if any, in your professional education would have been beneficial for you?

15. If you had it to do over again, would you go to CWRU (CIT, WRU)? _____Yes _____No

Why or why not?

PERSONAL INFORMATION

16. Your present age: ______

17. Sex: ____Male ____Female

18. Marital status: (circle the appropriate number and give date if applicable)

Single . . . 1

Married . . . 2
(date) ______________

Other . . . 3
(please specify) __________
____

19. Number of children: _____ Ages of children: ______________

20. Parents' and spouse's education: (circle the appropriate number in each column)

	Father	Mother	Spouse
Eighth grade or less.	1	1	1
Some high school.	2	2	2
Graduated from high school.	3	3	3
Some college.	4	4	4
Received Bachelors degree (or currently working for it)	5	5	5
Received Masters degree (or currently working for it)	6	6	6
Received Doctorate or equivalent (or currently working for it).	7	7	7
Not applicable.			8

21. Parents' and spouse's primary occupation: (circle the appropriate number in each column)

	Father	Mother	Spouse
Professional (e.g., doctor, engineer, professor, social worker).	1	1	1
Proprietor or manager	2	2	2
Teacher	3	3	3
Military.	4	4	4
Clerical or sales	5	5	5
Service worker.	6	6	6
Skilled worker.	7	7	7
Semi- or unskilled worker	8	8	8
Other . . . . (please specify) ______________________	9	9	9
Not applicable.			10

22. Religious affiliation: (circle the appropriate number)

Catholic . . . 1 Protestant . . . 2 Jewish . . . 3 Other . . . 4
Unaffiliated . . . 5 (please specify) ____________

23. Race or ethnic origin: (circle the appropriate number)

Afro-American (Black) . . .1 Caucasian . . . 2 Oriental . . . 3
(please specify) ______________
Spanish American (Hispanic) . . . 4 American Indian . . . 5

As was mentioned in the cover letter, our plan is to analyze the data you send us on this questionnaire in order to identify your major issues and concerns about the professional education you received at Case Western Reserve University (Case Institute) and its contribution to your personal and career development. Following this preliminary analysis we would like to pursue these issues and concerns in greater depth via personal interviews with a selected group of alumni who volunteer to discuss the topics raised in this questionnaire in greater detail. Further involvement would require about three hours of your time to be arranged at your convenience. Would you be willing to volunteer?

____ I would like to participate further in this work. Please contact me at:

Name ____________________

Phone ____________________

Address ____________________

____

____

____ I think I would like to participate further but would like more information. Please contact me (complete contact information above).

____ I am not interested in further participation.

COMMENTS:

THANK YOU!

LISTS OF JOB CHARACTERISTICS

LIST A

Type of Organization

1. Family business
2. Own professional office
3. Founder or co-founder of a business enterprise
4. Member or partner in a professional office
5. Private profit-making company or corporation
6. University research organization or affiliated institute
7. University or college: academic department or administration
8. Junior college: academic department or administration
9. Non-profit research organization or institute, NOT affiliated with a university
10. Hospital or clinic
11. Public welfare organization
12. Private welfare organization
13. Elementary or secondary school
14. Federal government
15. State government
16. Local government
17. Church or other religious organization
18. Other (please specify on questionnaire)

LIST B

Location

1. New England (Maine, New Hampshire, Vermont, Connecticut, Massachusetts, Rhode Island)
2. Mid-Atlantic (New York, Pennsylvania, New Jersey, Maryland, Delaware, District of Columbia)
3. South (Virginia, North Carolina, South Carolina, Georgia, Florida, West Virginia, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Kentucky)
4. Mid-West (Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota)
5. North Central (Iowa, Kansas, Nebraska, Montana, North Dakota, South Dakota, Colorado, Wyoming, Missouri, Idaho, Utah, Nevada)
6. Southwest (Texas, New Mexico, Arizona, Oklahoma)
7. West Coast (California, Oregon, Washington, Hawaii, Alaska)
8. Outside of the United States

LIST C

Job Descriptions

From the list of job descriptions below, pick ONE OR MORE that best describe your job. For example, if you are the director of an engineering consulting group, pick 1, 5, 9.

1. Engineer
2. Scientist
3. Planner
4. Consultant/Therapist
5. Manager, director or executive
6. Business specialist (marketing, finance, production, etc.)
7. Salesperson
8. Teacher/Educator
9. Consultant
10. Researcher
11. Social Service
12. Other (please specify on questionnaire)

(continued on other side)

LIST D

Reasons for Changing Jobs

Please read the list of possible reasons for changing jobs given below, and then choose as many as you feel are important and LIST THEM IN ORDER OF IMPORTANCE. Each reason represents both a negative reason for leaving a job and a positive one for taking a new job. For example, you may have left a job because the workload was not reasonable, or because the workload in the new job was better. In either case, you would list reason #1.

1. Did not have a reasonable workload
2. Did not have an opportunity for advancement
3. Did not have good physical working conditions
4. Did not have good fringe benefits
5. Did not have job security (steady work)
6. Did not have an opportunity for high earnings
7. Did not like the location of the job
8. Did not have an opportunity to exercise leadership
9. Did not get the recognition I deserve when doing a good job
10. Did not work for a highly regarded company
11. Did not work in an efficiently run department
12. Did not have a job that is highly regarded by others in the company--a job with some prestige
13. Did not have a job that allowed me to make a real contribution to the success of the company
14. Did not have challenging work to do--work from which I can get a personal sense of accomplishment
15. Did not have enough freedom to adopt my own approach to the job--to be creative and original
16. Did not have training or educational opportunity (to improve knowledge and skills)
17. Did not have a job that allows me to make a real contribution to society
18. Did not have a job that allows me to work on crucial, relevant problems
19. Did not work in a department where the people are friendly and congenial
20. Did not have the opportunity to work with people rather than things
21. Did not have a job that leaves sufficient time for family and personal life
22. Not by my choice (e.g., was laid off, company was shut down, job or project was finished, contract not renewed, was not re-appointed, etc.)
23. Change in family circumstances (please specify on questionnaire)
24. Other (please specify on questionnaire)

APPENDIX B

THE ALUMNI STUDY INTERVIEW AND TESTING PROCEDURE

NIE "C" SAMPLE INTERVIEW GUIDE

For LONG INTERVIEW FORM

Record Data at Top	
Introduction	Get permission to tape record
Questions #1 thru #3	Choice of CASE Choice of career Imagine career would be
#4a thru #4d	Course and Faculty Evaluation
#4e	Opinion of PE Value
#4f	Social Climate
#4g	Whole of life vs. Work only Engineers curriculum Social Work curriculum
#4h	Other influences
#4i	Specific program changes
Introduce Life Line	
Respondent does Life Line	
#5	Movement and Variation of Drawing
#6	Important Personal Issues
#7	Satisfaction
#8	Successful
Introduce Learning Section	
#9	Most important learning experiences
#10	Acquiring new knowledge
#11	Needs for learning now Availability of resources
BREAK	Record Time
OBTAIN LSI, ASI, SENTENCE COMPLETION	
Administer Perception Reaction	Score and Explain
Administer GEFT	Score and Explain
Review LSI Grid	
Administer Scales	Explain
Obtain transcript release	

NIE "C" SAMPLE INTERVIEW

GUIDE FOR SHORT INTERVIEW (Use long form)

Record data at Top Introduction	Get permission to tape record
Combine Questions #1 thru #3	
Combine Course and Faculty Evaluation Questions #4a thru #4d	
Ask one general question regarding Social Climate and the impact of Other Influences. Questions #4f and #4h	
Combine Questions #4i and #4g	
Introduce Life Line	
Respondent does Life Line	
Combine Questions #5 and #6	
Combine Questions #7 and #8	
Introduce learning section	Combine Questions #9 and #10 Ask Question #11
Obtain LSI, ASI, SENTENCE COMPLETION	
Adminster Perception-Reaction	Briefly explain and score
Administer GEFT	Briefly explain and score
Show LSI Grid	Briefly explain
Administer Scales	
Obtain Transcript Release	

GUIDE: When questions can be combined - you will be asking for more general responses than if using the long form. That is the sacrifice that we must make.

If you have a sense that the interviewee is enjoying the interview - say that time constraints make it impossible to get as in-depth as we would like, and urge respondent to set up another time with you for more detailed analysis - or suggest that you go alittle bit longer now.

Don't push for detail. You don't have time. Do the best you can.

Record on long form - note which questions are being combined by use of arrows from one question to another where response is written

NIE "C" SAMPLE INTERVIEW

Respondent's Name: ______________________________

Respondent's Code: __________

Date of Interview: ______________________________

Starting Time: ______________

Interviewer: The purpose of this interview is for us to gain specific information about several areas of your life. We will be asking you about your career, your learning experiences, and a few aspects of your personal life - within the context of your professional education at CWRU. (CIT) The information we collected from you and others last spring in the questionnaire (show B Questionnaire), is being analyzed for general comparisons and patterns across five alumni years. In this interview we want to understand your individual patterns and specific experiences. Your information now will help us verify the patterns we're beginning to see in the general data, as well as deepen our understanding of the briefer responses asked for in the Questionnaire.

We also want you to get something out of this interview. We'd like for you to take this opportunity to explore some issues for yourself, around your career patterns, your learning experiences, and your life in general. We really see this as a joint learning effort with you - and invite you to think of it in that way. We welcome your input and your feedback as we go along.

Let me give you an overview of how we've designed this time today. This interview should take about two hours. In the first hour, I will be asking you to expand on some of your responses to the Questionnaire, and on issues around your career. Then we'll focus on your particular approach to learning as you have experienced it and perhaps consciously developed it over the years. We want to look at your learning approach in relationship to your professional education as well. As a part of this exploration, I'l like you to participate in two exercises related to the ones you received in in the mail and returned today. That will take us into the second hour of the interview.

After these exercises, I want to share with you our purpose for using these exercises, and to give you some specific feedback on your responses to them. We'll also spend more time discussing learning issues using a new model we are developing. Finally, there will be time at the end to discuss your responses in general to any of the research questions you are particularly interested in. As we go along, if you feel you need more time to answer or respond to certain questions, please let me know. Again, I encourage you to ask questions of me at any time during today's interview.

Our purpose in doing this this way is to get your unbiased assessment of yourself in specific areas, and to share with you the particular framework we're using to study life long learning. We hope you will go away from here today with perhaps a different perspective within which to view your learning and professional development. Perhaps even your own growth. We, in turn, hope your participation will help us validate our perspective on life long learning and adult development.

So...before we get to the questions themselves, is there anything you would like to ask about the study or the interview design for today?

Okay. First let me check with you about any changes that may have occurred since you filled out the Questionnaire.

(refer to B Questionnaire and record any changes in the following here)

Do you still have the same job with the same employer? (refer to first page of B Questionnaire)

Is this address and phone number still correct? (refer to last page of B Questionnaire)

Are there any other changes that have occurred since you filled out the Questionnaire? (probe: marital status, family status

INTERVIEW PROTOCOL

1. Let's begin with how you came to choose CASE for an education in social work (or) engineering.

(probe: who or what influenced the decision)

2. What made you decide to pursue social work (or) engineering as a career?

(probe: interests, family, work exp., personal exp.)

3. How did you imagine your career would be before you started at CASE?

(probe: specific goals, fantasies about professional life in general, special foci)

(bring out course and faculty lists for cohort years)

Now I'd like you to take a look at these lists of core courses and faculty from the years you attended SASS (or) CIT. I'm going to ask you to refer to these lists for the next set of questions.

(for ENGINEERS - have course lists from their particular field - taken from B Questionnaire)

4. a. From where you are now in your career, which one(s) of these courses would you say was most helpful? (record course name here)

Were there any courses outside of your department which were significant for you? What were they? (record course name here)

What makes these courses significant to you?

(probe: preparation for career

relevance to personal growth

relevance to professional growth

peak learning experience

course learning style/faculty

**labs vs. lectures)

***respondent's own answer

What did you think of these courses at the time you were taking them?

4b. From where you are now in your career, which one(s) of these courses would you say was least helpful? (record name here)

What makes these courses less significant to you?

(probe: preparation for career

irrelevance to personal/professional growth

poor learning experience

course learning style/faculty

lab vs. lecture)

***respondent's own answer

What did you think of these courses at the time you were taking them?

4c. Now looking at the faculty lists - I'd like to ask you the same questions.

Looking back from where you are now, who were the faculty who were most positively significant to you? (record data here)

Were there faculty outside of your school who were significant to you? Who were they?

What made these faculty significant to you?

(probe: mentor relationship
teaching style
skill and content sharing
personal/professional growth)

What did you think of them at the time?

4d. Who were the faculty who were least helpful to you? (recording names is not required here)

What made these faculty less significant to you?

(probe: teaching style

irrelevant material presentation

personal/professional issues)

What did you think of them at the time?

4e. Has your overall opinion about the value of your professional education changed over the years since your graduation?

If so, how has it changed?

What do you think has influenced your change in attitude?

(probe: work experience

continuing education

maturation process

personal and/or professional attitudinal shifts)

4f. What was the social climate like for you during those years at CASE? That is, how do you think your education was influenced by the events of the world at that time, and how your profession was viewed in relation to the world demands?

(probe: Engineers - Sputnick (1955, 1960)

Social Workers - War on Poverty (1960 - 1975)

4g. Would you say your education at SASS/CIT prepared you for your life as a whole, or just for your work?

Engineers: Do you feel you needed more liberal arts or humanities curriculum?

Do you feel you needed more exposure to working in groups or project teams? More management skills?

Social Workers: Do you feel you needed more managerial experience

Do you feel you needed more exposure to working in groups or teams?

4h. Was there anything else about your experience at CASE that you felt was significant?

(probe: Engineers (1955, 1960, 1965) - fraternity affiliation

Extra-curricular affiliations

Field work

Tutorials)

4i. Are there any other specific changes which you would like to see incorporated into the SASS/Engineering program today?

(place legal size sheet + marker in front of subject)

Now I'd like to get a broader view of your life and career - where you've been, where you're going, and the interplay of your career and personal life.

I'd like you to use this piece of legal-size paper and this marker, and I'd like you to imagine your life as a line (of any shape, length, or texture) - but a continuous line. Draw, if you will, a representation of the course of your life from its beginning until its end in the future.

(let respondent draw life-line)

Now, put at the top of the line either ages or years that serve as significant markers of time for you.

Now, put an "X" on this drawing which represents where you are now.

Okay. Put one more mark, using a "Y" plus an arrow extending across the drawing, which represents where your education at CASE occurred.

Now, will you write in on the drawing the various jobs you have had?

Where, on this drawing, are the important personal events in your life?

(probe: marriage, divorce, death of parents, children, etc.)

Finally, looking at the future section of the drawing, what are some of the events and/or professional experiences which you envision taking place?

(write these in - event and approximate time of occurrence)

5. Now, can you tell me what the movement and variation in the line mean?

(probe: what was happening here/ both past and present)

6. What have been and what are now the important personal issues which you have dealt with and are dealing with now?

(probe: dealing with success

dealing with failure

integrating work and family/social sphere

sex role issues - for women in particular

transitions)

7. At this particular point in your life today, how satisfied are you about where you're at in your career and your life in general?

(probe: avocation, hobbies, special talents)

What are the most satisfying aspects of your life right now?

Is there anything missing for you now? What is it?

8. How successful do you think you are in your career?

What are the ingredients of a successful life and career for you?

How close are you to reaching your career goals?

Is there anything else you want to add here before we move on to the section on learning?

This next section deals with learning. By learning, we mean the experiences you've had, academic and otherwise, in which you acquired new knowledge, how you thought about it, and eventually how you used it in your life.

9. Since you've left CASE, what have been the most important learning experiences for you - both in your career and other areas of your life?

What was it about these learning experiences that makes them important?

(probe: what was learned

relevance to personal/professional growth

characteristics of the environment or setting

particular person

when they occurred)

10. As you've moved through your life and career, have there been times when you felt that you needed to acquire more or new knowledge and learning?

If so, what did you feel you needed to learn at those times?

(probe: skills, behaviors, attitudes)

11. Are there things you feel you need to learn now? What are they?

What are the resources available to you now for learning these things?

(probe: people

continuing education

learning through work

specific environments

materials)

What are the resources which you feel are not available to you for learning these things?

Okay. We're going to stop here, and take a break. Then I'd like to have you do the two learning exercises I mentioned earlier. Do you have any questions before we break?

Record Time: ____________________

***OBTAIN RESPONDENTS LSI, ASI, SENTENCE COMPLETION TESTS. File in Manila Envelop

TEST ADMINISTRATION AND EXPLANATION

1. PERCEPTION-REACTION

This first exercise is called the Perception-Reaction **Measure**. It is not a timed exercise. You may take as long as you need on each item.

As we go along, I will present you with one problem at a time. There can be more than one correct answer to these problems. When you have your answer, just tell me out loud what it is. If you need scrap paper to work out your answer, you may use these sheets here. (offer extra sheets of paper). Please do not mark on the problem card itself.

Okay, let me give the Perception-Reaction Measure to you now. Then we'll score it, and discuss the results.

(Administer P-R Measure)

(Score P-R Measure)

What this measure describes is the extent to which you reflect or think about problems, and the extent to which you act upon problems. The simplest way to explain the results is to say that the more time you spent on each problem is an indication of the extent to which you think before you act. In the same sense, the less time you required is an indication of the extent to which you act on problems immediately in an effort to get things done.

We are aware, however, that the **speed in which** you did these problems can be an indication of other factors as well. This is a descriptive measure only. It does not evaluate you, or claim one way of learning over another. It simply describes your preference for approaching a problem-solving task in a certain way.

All of us reflect and act upon problems, some reflecting more that others, and others acting more than reflecting. We are interested in how people come to prefer one mode of being over another..

2. GROUP INBEDDED FIGURES TEST

This next exercise is called the Group Inbedded Figures Test. This measure is a timed exercise. It asks you to find figures that are inbedded in drawings.

Unlike the Perception-Reaction Measure, this exercise has very specific instructions which I need to give you. So, let me give you the measure, and then we'll score it, and discuss it.

(Administer GEFT - refer to Manual Instruction page)

(Score GEFT)

What this test describes is the way in which you see your world along two dimenstions - which for want of better words are called "global" and "analytical". What "global" means is that you tend to see the total figure, or the whole picture, over seeing the particular. In the test, a "global" response is indicated by a lower score on the exercises - with the assumption being that you were taking in the whole field of the picture - as opposed to immediately zeroing in on the particular figure to be found.

In the reverse sense, the "analytical" means that you tend to see the particular figure, or parts, over seeing the total picture. In the test, an "analytical" response is indicated by a higher score with the assumption being that you were taking in only the particular figure to be found - and ignoring the total field. In a sense, the analytical mode sees objects independent of the field in which they are inbedded. Whereas, the global mode sees objects interconnected or as very much a part of the field in which they are inbedded.

Again, this measure describes a preference for a certain way of seeing the world. Neither way is more "right" than the other. We all do both. Again, we are interested in understanding how people prefer using one mode over another.

3. LEARNING STYLE INVENTORY

In conjunction with all of this, let's look at the Learning Style Inventory which you received in the mail.

The Learning Style Inventory is based on the assumption that learning takes place through a four phase process. Let me explain the LSI Grid to you, and look at where your scores fall on the Grid.

(Explain LSI Grid - delineating each of the four modes)

As you might be able to see, the Perception-Reaction Measure was an indication of your development along the Reflective Observation and Active Experimentation dimension. The Group Inbedded Figures Test was an indication of your development along the Concrete Experience and Abstract Conceptualization dimension.

(Give any further explanation which is needed around these three measures. Ask for questions)

ADAPTIVE COMPETENCY SCALES

Finally, we are interested in getting some type of evaluation of your development along each of these modes at different times in your life. Each of us develops varying degrees of skill in each of these modes of learning over time. We also have preferences for using some modes over others. At the same time, our environments aid in the development of these skills.

We have been working on a set of scales which I would like to have you do. These scales ask you to rate yourself, and also various environments, along the four dimensions we've been talking and working with already.

(Bring out scales; Begin with CONCRETE EEXPERIENCE)

Here is a page with a description of the Concrete Experience Mode written on it. Read this over.

(Give respondent page. Expand on description if needed)

Now, I'd like you to take a look at the set of scales on this same page. These scales ask you to rate yourself along a specific continuum - to the degree you were oriented toward Concrete Experience at three times in your life. Let's go over the rating descriptions together so you're sure you understand them.

(Go over ratings on scale - explicate if needed)

Now, please rate yourself on each scale CIRCLING the appropriate point which corresponds best to how you rate yourself. You are free to refer to the description at the top of the page.

(Let respondent do the rating)

(Go on and do the remaining seven scales in the same manner - making sure respondent fully understands each description and each set of ratings.)

(Do scales in the following order:
CE Environment
RO Self
RO Environment
AC Self
AC Environment
AE Self
AE Environment)

Okay. That's all the questions I have. Is there anything from the interview, exercises, or the questionnaire which you'd like to discuss?

RECORD TIME: ____________________ (for tests and scales)

Before we end, I have one final request to make of you - and you may feel free to decline. Part of our comparison between the general trends of the total sample population and the individual patterns we've discussed today, focuses around the individual learning programs at SASS and CIT for specific years. We'd like to get as detailed a picture as possible of the pattern of coursework people took in those years. To do this, I'd like to be able to look at a copy of your transcript from the years you were at CASE. All of the information will be used strictly for research comparison.

Would you have any objection to us looking at your transcript?

If yes: Can you tell me what reservations you have about it?

(explore those reasons - push for clarity)

If no: Thank you. I really appreciate your cooperation. Do you have a personal copy you can give us? (If yes: Ask how soon we can get it) (If no: Ask if they would would be willing to sign the prepared release form, so we may get a copy of their transcript from the registrar)

(Pull out transcript release form - obtain signature)

Well, that's all. Thank you so much for your participation. We're finished now.

INTERVIEWER'S NAME: ____________________

Interviewer's Comments on Respondent: (honesty, anxiety, willingness)

Interviewer"s Comments on Interview Process in General: (problems, good things, yourself) Use back of sheet, if necessary.

An orientation toward CONCRETE EXPERIENCE focuses on being involved in experiencing and dealing with immediate human situations in a personal way. It emphasizes feeling as opposed to thinking; a concern with the uniqueness and complexity of present reality as opposed to theories and generalizations; an intuitive "artistic" approach as opposed to the systematic, scientific approach to problems. People with concrete experience orientation enjoy and are good at relating to others. They are sensitive and empathic to people's values and feelings. They are often good intuitive decision-makers and function well in unstructured situations. The person with this orientation values relating to people, being involved in real situations and an open-minded approach to life.

Rate on the scales below: (CIRCLE)

TO WHAT EXTENT WERE YOU ORIENTED THIS WAY?

	At Case	First Job After Case	Current Job
I avoided this orientation.	1	1	1
I was unconcerned with this orientation.	2	2	2
I responded this way if I had to.	3	3	3
I sometimes chose to be this way.	4	4	4
I worked at developing this orientation.	5	5	5
I preferred to deal with situations this way.	6	6	6
I organized my life around this orientation.	7	7	7

An orientation toward CONCRETE EXPERIENCE focuses on being involved in experiencing and dealing with immediate human situations in a personal way. It emphasizes feeling as opposed to thinking; a concern with the uniqueness and complexity of present reality as opposed to theories and generalizations; an intuitive "artistic" approach as opposed to the systematic, scientific approach to problems. People with concrete experience orientation enjoy and are good at relating to others. They are sensitive and empathic to people's values and feelings. They are often good intuitive decision-makers and function well in unstructured situations. The person with this orientation values relating to people, being involved in real situations and an open-minded approach to life.

Rate on the scales below: (CIRCLE)

TO WHAT EXTENT DID THE ENVIRONMENT BELOW FACILITATE THE EXPRESSION OF THIS ORIENTATION?

	At Case	At First Job	At Current
t inhibited this orientation.	1	1	1
It was unconcerned with this orientation.	2	2	2
It tolerated this orientation.	3	3	3
t supported the expression of this orientation.	4	4	4
t stimulated the expression of this orientation.	5	5	5
t encouraged the expression of this orientation.	6	6	6
t actively promoted this orientation.	7	7	7

An orientation toward REFLECTIVE OBSERVATION focuses on understanding the meaning of ideas and situations by carefully observing and impartially describing them. It emphasizes understanding as opposed to practical application; a concern with what is true or how things happen as opposed to what will work; an emphasis on reflection as opposed to action. People with a reflective observation orientation enjoy and are good at sensing the meaning of situations and ideas and at pondering their implications. They are good at looking at things from different perspectives and at appreciating different points of view. They like to rely on their own thought and feelings to form opinions. People with this orientation value patience, impartiality and considered thoughtful judgement.

Rate on the scales below: (CIRCLE)

TO WHAT EXTENT WERE YOU ORIENTED THIS WAY?

	At Case	First Job After Case	Current Jo
I avoided this orientation.	1	1	1
I was unconcerned with this orientation.	2	2	2
I responded this way if I had to.	3	3	3
I sometimes chose to be this way.	4	4	4
I worked at developing this orientation.	5	5	5
I preferred to deal with situations this way.	6	6	6
I organized my life around this orientation.	7	7	7

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Rate on the scales below: (CIRCLE)

TO WHAT EXTENT DID THE ENVIRONMENT BELOW FACILITATE THE EXPRESSION OF THIS ORIENTATION?

	At Case	At First Job	At Current
It inhibited this orientation.	1	1	1
It was unconcerned with this orientation.	2	2	2
It tolerated this orientation.	3	3	3
It supported the expression of this orientation.	4	4	4
It stimulated the expression of this orientation.	5	5	5
It encouraged the expression of this orientation.	6	6	6
It actively promoted this orientation.	7	7	7

An orientation toward ABSTRACT CONCEPTUALIZATION focuses on using logic, ideas and concepts. It emphasizes thinking as opposed to feeling; a concern with building general theories as opposed to intuitively understanding unique specific cases; a scientific as opposed to artistic approach to problems. A person with an abstract conceptual orientation enjoys and is good at systematic planning, manipulation of abstract symbols, and quantitative analysis. People with this orientation value precision, the rigor and discipline of analyzing ideas and the aesthetic quality of a neat conceptual system.

Rate on the scales below: (CIRCLE)

TO WHAT EXTENT WERE YOU ORIENTED THIS WAY?

	At Case	First Job After Case	Current Job
I avoided this orientation.	1	1	1
I was unconcerned with this orientation.	2	2	2
I responded this way if I had to	3	3	3
I sometimes chose to be this way.	4	4	4
I worked at developing this orientation.	5	5	5
I preferred to deal with situations this way.	6	6	6
I organized my life around this orientation.	7	7	7

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Rate on the scales below: (CIRCLE)

TO WHAT EXTENT DID THE ENVIRONMENT BELOW FACILITATE THE EXPRESSION OF THIS ORIENTATION?

	At Case	At First Job	At Current
It inhibited this orientation.	1	1	1
It was unconcerned with this orientation.	2	2	2
It tolerated this orientation.	3	3	3
It supported the expression of this orientation.	4	4	4
It stimulated the expression of this orientation.	5	5	5
It encouraged the expression of this orientation.	6	6	6
It actively promoted this orientation.	7	7	7

An orientation toward ACTIVE EXPERIMENTATION focuses on actively influencing people and changing situations. It emphasizes practical applications as opposed to reflective understanding; a pragmatic concern with what works as opposed to what is absolute truth; an emphasis on doing as opposed to observing. People with an active experimentation orientation enjoy and are good at getting things accomplished. They are willing to take some risk in order to achieve their objectives. They also value having an impact and influence on the environment around them and like to see results.

Rate on the scales below: (CIRCLE)

TO WHAT EXTENT WERE YOU ORIENTED THIS WAY?

	At Case	First Job After Case	Current Jo
I avoided this orientation.	1	1	1
I was unconcerned with this orientation.	2	2	2
I responded this way if I had to.	3	3	3
I sometimes chose to be this way.	4	4	4
I worked at developing this orientation.	5	5	5
[illegible] preferred to deal with situations this way.	6	6	6
I organized my life around this orientation.	7	7	7

An orientation toward ACTIVE EXPERIMENTATION focuses on actively influencing people and changing situations. It emphasizes practical applications as opposed to reflective understanding; a pragmatic concern with what works as opposed to what is absolute truth; an emphasis on doing as opposed to observing. People with an active experimentation orientation enjoy and are good at getting things accomplished. They are willing to take some risk in order to achieve their objectives. They also value having an impact and influence on the environment around them and like to see results.

Rate on the scales below: (CIRCLE)

TO WHAT EXTENT DID THE ENVIRONMENT BELOW FACILITATE THE EXPRESSION OF THIS ORIENTATION?

	At Case	At First Job	At Current
t inhibited this orientation.	1	1	1
It was unconcerned with this orientation.	2	2	2
It tolerated this orientation.	3	3	3
t supported the expression of this orientation.	4	4	4
t stimulated the expression of this orientation.	5	5	5
t encouraged the expression of this orientation.	6	6	6
t actively promoted this orientation.	7	7	7

APPENDIX C

SAMPLE STUDENT SURVEY
FOR SASS STUDENTS

STUDENT SURVEY OF
PROFESSIONAL EDUCATION AND CAREER EXPECTATIONS

BEST COPY AVAILABLE

IMPACT OF PROGRAM

1. Assessment of educational experiences: Below is a list of abilities that people possess to varying degrees. We are concerned with the contribution of your CWRU/CIT educational experiences to the development of these abilities.

Consider the learning experiences in each column below and:

circle -1 if they led to a decrease or negative development of a given ability
circle 0 if they were unrelated or had no impact on your development of a given ability
circle +1 if they contributed some or a little to the development of a given ability
circle +2 if they contributed a great deal to the development of a given ability

Effect of → ↓ On	Typical Theory Courses				Typical Methods Courses				Field Placements			
1. Listening with an open mind	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
2. Developing comprehensive plans	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
3. Building conceptual models	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
4. Committing yourself to objectives	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
5. Influencing and leading others	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
6. Making decisions	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
7. Designing experiments	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
8. Being sensitive to values	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
9. Being able to adapt to changing circumstances	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
10. Generating alternative ways of doing things	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
11. Organizing information	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
12. Setting goals	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
13. Experimenting with new ideas and approaches	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
14. Imagining implications of ambiguous situations	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
15. Identifying and defining problems	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
16. Dealing with people	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
17. Gathering information	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
18. Seeking and exploiting opportunities	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
19. Communicating with others	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
20. Analyzing quantitative data	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
21. Being sensitive to people's feelings	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
22. Being personally involved	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
23. Testing theories and ideas	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
24. Measuring and evaluating effective performance	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
25. Working in groups	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
26. Seeing how things fit in the big picture	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
27. Choosing the best solution to a defined problem	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2

NATURE OF LEARNING SITUATIONS

Each of the four paragraphs below describes a basic tendency or orientation people could have toward their learning environments, or toward life in general. Please read each paragraph and then respond to the questions below each statement.

A An orientation toward EXPERIENCING focuses on being involved in experiencing and dealing with immediate human situations in a personal way. It emphasizes feeling as opposed to thinking; a concern with the uniqueness and complexity of present reality as opposed to theories and generalizations; an intuitive "artistic" approach as opposed to the systematic, scientific approach to problems. People with concrete experience orientation enjoy and are good at relating to others. They are sensitive and empathic to people's values and feelings. They are often good intuitive decision-makers and function well in unstructured situations. The person with this orientation values relating to people, being involved in real situations and having an open-minded approach to life.

2. Think of a situation or experience while at SASS where this orientation was particularly called for. Please describe briefly: ____________________

____

____

____

3. To what extent has your education here developed this orientation in you? (Circle one.)

1	2	3	4	5	6	7
It inhibited this	It was unconcerned with this	It tolerated this	It supported this	It stimulated this	It encouraged this	It actively promoted this

B An orientation toward REFLECTIVE OBSERVATION focuses on understanding the meaning of ideas and situations by carefully observing and impartially describing them. It emphasizes understanding as opposed to practical application; a concern with what is true or how things happen as opposed to what will work; an emphasis on reflection as opposed to action. People with a reflective observation orientation enjoy and are good at sensing the meaning of situations and ideas and at pondering their implications. They are good at looking at things from different perspectives and at appreciating different points of view. They like to rely on their own thought and feelings to form opinions. People with this orientation value patience, impartiality and considered thoughtful judgment.

4. Think of a situation or experience while at SASS where this orientation was particularly called for. Please describe briefly: ____________________

____

____

____

5. To what extent has your education here developed this orientation in you? (Circle one.)

1	2	3	4	5	6	7
It inhibited this	It was unconcerned with this	It tolerated this	It supported this	It stimulated this	It encouraged this	It actively promoted this

C An orientation toward ABSTRACT CONCEPTUALIZATION focuses on using logic, ideas, and concepts. It emphasizes thinking as opposed to feeling; a concern with building general theories as opposed to intuitively understanding unique specific cases; a scientific as opposed to an artistic approach to problems. A person with an abstract conceptual orientation enjoys and is good at systematic planning, manipulation of abstract symbols, and quantitative analysis. People with this orientation value precision, the rigor and discipline of analyzing ideas and the aesthetic quality of a neat conceptual system.

6. Think of a situation or experience while at SASS where this orientation was particularly called for. Please describe briefly: ____________________

____

____

____

7. To what extent has your education here developed this orientation in you? (Circle one.)

1	2	3	4	5	6	7
It inhibited this	It was unconcerned with this	It tolerated this	It supported this	It stimulated this	It encouraged this	It actively promoted this

D An orientation toward ACTIVE EXPERIMENTATION focuses on actively influencing people and changing situations. It emphasizes practical applications as opposed to reflective understanding; a pragmatic concern with what works as opposed to what is absolute truth; an emphasis on doing as opposed to observing. People with an active experimentation orientation enjoy and are good at getting things accomplished. They are willing to take some risk in order to achieve their objectives. They also value having an impact and influence on the environment around them and like to see results.

8. Think of a situation or experience while at SASS where this orientation was particularly called for. Please describe briefly: ____________________

____

____

____

9. To what extent has your education here developed this orientation in you? (Circle one.)

1	2	3	4	5	6	7
It inhibited this	It was unconcerned with this	It tolerated this	It supported this	It stimulated this	It encouraged this	It actively promoted this

10. Work abilities: (Circle the appropriate number for each item.)

At the present time, how would you rate your level of ability in the following skill areas (whether you use them in your present situation or not)?

	I am: Unskilled			Average		Highly Skilled	
1. Listening with an open mind	1	2	3	4	5	6	7
2. Developing comprehensive plans	1	2	3	4	5	6	7
3. Building conceptual models	1	2	3	4	5	6	7
4. Committing yourself to objectives	1	2	3	4	5	6	7
5. Influencing and leading others	1	2	3	4	5	6	7
6. Making decisions	1	2	3	4	5	6	7
7. Designing experiments	1	2	3	4	5	6	7
8. Being sensitive to values	1	2	3	4	5	6	7
9. Being able to adapt to changing circumstances	1	2	3	4	5	6	7
10. Generating alternative ways of doing things	1	2	3	4	5	6	7
11. Organizing information	1	2	3	4	5	6	7
12. Setting goals	1	2	3	4	5	6	7
13. Experimenting with new ideas and approaches	1	2	3	4	5	6	7
14. Imagining implications of ambiguous situations	1	2	3	4	5	6	7
15. Identifying and defining problems	1	2	3	4	5	6	7
16. Dealing with people	1	2	3	4	5	6	7
17. Gathering information	1	2	3	4	5	6	7
18. Seeking and exploiting opportunities	1	2	3	4	5	6	7
19. Communicating with others	1	2	3	4	5	6	7
20. Analyzing quantitative data	1	2	3	4	5	6	7
21. Being sensitive to people's feelings	1	2	3	4	5	6	7
22. Being personally involved	1	2	3	4	5	6	7
23. Testing theories and ideas	1	2	3	4	5	6	7
24. Measuring and evaluating effective performance	1	2	3	4	5	6	7
25. Working in groups	1	2	3	4	5	6	7
26. Seeing how things fit in the big picture	1	2	3	4	5	6	7
27. Choosing the best solution to a defined problem	1	2	3	4	5	6	7

LEARNING

11. Learning style

Each person has ways he or she prefers to learn. The following sets of words characterize ways of learning. There are nine sets of four words listed below. Rank order the words in each set by assigning a "4" to the word which best characterizes your learning style, a "3" to the word which next best characterizes your learning style, a "2" to the next most characteristic word, and a "1" to the word which is least characteristic of you as a learner.

You may find it hard to choose the words that best characterize your learning style. Keep in mind that there are no right or wrong answers--all the choices are equally acceptable. The aim is to describe how you learn, not to evaluate your learning ability.

Be sure to assign a different rank number to each of the four words in each set; do not make ties. Be sure to give a "4" rank to the word that is most characteristic of you as a learner.

(See Kolb, 1976)

CAREER PLANS

12. Ideal first job characteristics: Circle the appropriate number for each item in terms of how much the statement is descriptive of skills needed in an ideal job you would like to be doing after graduation.

	Not at all characteristic 1	2	3	4	5	6	Very characteristic 7
1. Listening with an open mind	1	2	3	4	5	6	7
2. Developing comprehensive plans	1	2	3	4	5	6	7
3. Building conceptual models	1	2	3	4	5	6	7
4. Committing yourself to objectives	1	2	3	4	5	6	7
5. Influencing and leading others	1	2	3	4	5	6	7
6. Making decisions	1	2	3	4	5	6	7
7. Designing experiments	1	2	3	4	5	6	7
8. Being sensitive to values	1	2	3	4	5	6	7
9. Being able to adapt to changing circumstances	1	2	3	4	5	6	7
10. Generating alternative ways of doing things	1	2	3	4	5	6	7
11. Organizing information	1	2	3	4	5	6	7
12. Setting goals	1	2	3	4	5	6	7
13. Experimenting with new ideas and approaches	1	2	3	4	5	6	7
14. Imagining implications of ambiguous situations	1	2	3	4	5	6	7
15. Identifying and defining problems	1	2	3	4	5	6	7
16. Dealing with people	1	2	3	4	5	6	7
17. Gathering information	1	2	3	4	5	6	7
18. Seeking and exploiting opportunities	1	2	3	4	5	6	7
19. Communication with others	1	2	3	4	5	6	7
20. Analyzing quantitative data	1	2	3	4	5	6	7
21. Being sensitive to people's feelings	1	2	3	4	5	6	7
22. Being personally involved	1	2	3	4	5	6	7
23. Testing theories and ideas	1	2	3	4	5	6	7
24. Measuring and evaluating effective performance	1	2	3	4	5	6	7
25. Working in groups	1	2	3	4	5	6	7
26. Seeing how things fit into the big picture	1	2	3	4	5	6	7
27. Choosing the best solution to a defined problem	1	2	3	4	5	6	7

13. What will you most likely be doing in September of next year? (Check one.)

a. _____ Working (What is your job likely to be? ______________________________)

b. _____ Graduate school (Specify degree: ______________________)

c. _____ Other (Specify: ______________________________)

14. Choose the one statement below that best describes you:

a. _____ I have a job.

b. _____ My plans for next year are as complete as they can be at this time (e.g., I have arranged job interviews, etc.).

c. _____ I am now beginning to make inquiries into job possibilities, etc.

d. _____ I have not yet begun to make inquiries in this direction.

e. _____ Other ____

15. Please circle the number corresponding to the amount of influence each of the people or events in the left-hand column had on the formulation of your current career plans:

	Not at all influential			Of moderate influence			Of great influence
a. Self	1	2	3	4	5	6	7
b. Mother	1	2	3	4	5	6	7
c. Father	1	2	3	4	5	6	7
d. Other family member or spouse	1	2	3	4	5	6	7
e. Faculty member (specify __________)	1	2	3	4	5	6	7
f. Field instructor (specify _________ _______________)	1	2	3	4	5	6	7
g. Colleague	1	2	3	4	5	6	7
h. Friend	1	2	3	4	5	6	7
i. Peer group	1	2	3	4	5	6	7
j. Work you have done (specify ________ ___________________________)	1	2	3	4	5	6	7
k. Theory or book you have read (specify ______________________)	1	2	3	4	5	6	7
l. Course (specify ______________________)	1	2	3	4	5	6	7
m. Other ______________________	1	2	3	4	5	6	7

16. In the space below, briefly identify or describe the work you would most like to be doing *five* years from now:

____

____

____

____

____

____

PERSONAL IDENTITY

When we get to know someone we usually reveal bit by bit the characteristics that define us, for example, "I am an engineer, a former state diving champion, an enthusiastic researcher, a controlled person, creative, not very considerate of my parents." Another example, "I am a social worker, a parent of two children, intelligent, a person who likes privacy, a lover of art, a moody person."

17. Please describe yourself in your own words by answering the question "Who am I" with ten different self descriptive phrases.

	A	B
A. I am ______	______	______
B. I am ______	______	______
C. I am ______	______	______
D. I am ______	______	______
E. I am ______	______	______
F. I am ______	______	______
G. I am ______	______	______
H. I am ______	______	______
I. I am ______	______	______
J. I am ______	______	______

Now in the first column marked "A" rank order these ten personal characteristics in terms of their importance in defining you as a person. Give a "1" to the phrase that is most important to you and a "10" to the phrase that is least important.

Next in the column marked "B" rank order the 10 personal characteristics again in terms of how important they are for you to be a successful professional in your chosen field. Give a "1" to the phrase that you see as most important for your professional success and a "10" to the phrase that is least important, irrelevant, or will negatively affect your professional success.

18. If you see yourself as having other personal characteristics essential to your professional success, list them here:

______

______

______

19. Think for a moment about how you would like to be 10 years from now. This should be a realistic picture, not a wild fantasy.

List in order of importance the three most important personal characteristics of your future self if all goes well for you. If you have listed the characteristic already in the previous question, just write the letter (A-J) of the phrase in the space below

______

______

______

20. Personal life issues: Please circle one number for each statement to indicate how important each issue is at this point in your life.

	Not and/or less important		Somewhat important			Very important A key issue now	
a. Becoming more in touch with my feelings and values	1	2	3	4	5	6	7
b. Becoming my own person with identity and direction, not dependent on anyone else	1	2	3	4	5	6	7
c. Learning new skills and ideas	1	2	3	4	5	6	7
d. Further developing my specialized knowledge and expertise	1	2	3	4	5	6	7
e. Changing my goals and activities to more realistically reflect who I am and what I want from life	1	2	3	4	5	6	7
f. Developing a variety of interests	1	2	3	4	5	6	7
g. Having more time for myself	1	2	3	4	5	6	7
h. Being successful in my career or occupation	1	2	3	4	5	6	7
i. Contributing to society	1	2	3	4	5	6	7
j. Having a good family life	1	2	3	4	5	6	7
k. Using my leisure time meaningfully	1	2	3	4	5	6	7
l. Sharing my knowledge and skills, contributing to the next generation; being helpful to younger friends and associates	1	2	3	4	5	6	7
m. Accomplishing a few important things in the finite period I have left	1	2	3	4	5	6	7
n. Sharing everyday human joys with others, maintaining warm relationships	1	2	3	4	5	6	7
o. Being a parent, raising my children	1	2	3	4	5	6	7
p. Maintaining a vital relationship with my mate	1	2	3	4	5	6	7
q. Achieving my financial and material success goals	1	2	3	4	5	6	7
r. Maintaining my physical health and well being	1	2	3	4	5	6	7
s. Living in harmony with my religious beliefs and feelings	1	2	3	4	5	6	7
t. Coping with stress and pressure	1	2	3	4	5	6	7
u. Dealing with changes in my life	1	2	3	4	5	6	7
v. Contributing to community affairs	1	2	3	4	5	6	7
w. Attaining wisdom, seeing the "big picture"	1	2	3	4	5	6	7

PERSONAL INFORMATION

21. Your name (optional): ______________________________

22. Your present age: ______

23. Sex: ____Male _____Female

24. Marital Status: (Circle the appropriate number and give date if applicable.)

Single . . . 1 Married . . . 2 (date: ________) Other . . . 3 (please specify: __________________)

25. Number of children: ______ Ages of children: ____________________

26. Parents' and spouse's education: (Circle the appropriate number in each column.)

	Father	Mother	Spouse
Eighth grade or less	1	1	1
Some high school	2	2	2
Graduated from high school	3	3	3
Some college	4	4	4
Received Bachelors degree (or currently working on it)	5	5	5
Received Masters degree (or currently working on it)	6	6	6
Received Doctorate or equivalent (or currently working on it)	7	7	7
Not applicable			8

27. Parents' and spouse's primary occupation: (Circle the appropriate number in each column.)

	Father	Mother	Spouse
Professional (e.g., doctor, engineer, professor, social worker)	1	1	1
Proprietor or manager	2	2	2
Teacher	3	3	3
Military	4	4	4
Clerical or sales	5	5	5
Housewife/Househusband	6	6	6
Service worker	7	7	7
Skilled worker	8	8	8
Semi- or unskilled worker	9	9	9
Other (please specify) ____________________	10	10	10
Not applicable			11

28. Religious affiliation: (Circle the appropriate number.)

Catholic . . . 1 Protestant . . . 2 Jewish . . . 3 Other . . . 4 (please specify) __________

Unaffiliated . . . 5

29. Race or ethnic origin: (Circle the appropriate number.)

Afro-American (Black) . . . 1 Caucasian . . . 2 Oriental . . . 3 (please specify) ______________

Spanish American (Hispanic) . . . 4 American Indian . . . 5

30. Current Major: What stream are you in? ____________________

What is your area of specialization? ____________________

31. Enrollment status: (Circle one.) (a) Full-time student (b) Part-time student

32. How many different jobs (related to social work) have you had? (Include paid, volunteer, and field placement experience) _________

33. How many years of related social work experience have you had? (Include paid, volunteer, and field placement experience) _____years full-time work ____years part-time work

34. Place a mark next to each area in which you have worked:

_____Casework _____Group work _____Family therapy _____Research

_____Community organization _____Policy and planning _____Administration or management

_____Teaching

Circle up to three of the above areas in which you have had the most experience.

35. What percentage of your total work experience would you say has been in direct practice (casework, group work, family therapy) and indirect practice (community organization, policy and planning, administration or management, research, teaching)?

Direct practice _______% Indirect practice _________%

GENERAL

36. Some people remember events or incidents during their academic pursuits which they describe as turning points. Has there been such an incident for you? If so, please describe it briefly.

37. In retrospect, what has been most disappointing to you about your professional education at Case Western Reserve University?

What was most satisfying?

38. Knowing what you do now, what changes would you suggest to be made in the program you are completing? Why?

39. If you had it to do over again, would you go through the program you're now completing here at CWRU/CIT? _______Yes _______No

Why or why not?

Thank you for your time and thoughtful consideration.

If you would like feedback of the summary findings of this study, please write your name and mailing address below (summary reports should be available by July, 1980).

Name: ______________________________

Address: ______________________________

____

____

I would/would not (circle one) be interested in participating further in this study by volunteering to be interviewed.

APPENDIX D

FACULTY INTERVIEW PROTOCOL

INTRODUCTION NOTES

FACULTY INTERVIEW PROTOCOL - INTRODUCTION NOTES

- Study Objectives (Use handout)
- How We Came To You
  - Student Panel
  - Your course is significant Learning Environment for them.

Before starting - ask for syllabus, reading list, class schedule, etc.

- if you had already "contracted" for this meeting - ask for this documentation in advance

- Why Your Input is Important
  - Time and thought into design - not usually reflected in course outline.
  - We're interested in the notion of "press" and to what extent it is predetermined by subject matter, your style, your design, etc.
  - We're interested in seeing if we can "objectively" rate environments such as this course and if our descriptions fit your and the students' perceptions.

Name ____________

Course ____________

Date ____________

FACULTY INTERVIEW PROTOCOL

1. How would you describe this course to a layman? What are its distinguishing features, activities, sequence of events, etc.? (What's unique about this course? What stands out?)

2. Please tell me your goals or objectives for this course? (What do you want students to learn?)

3. How would you describe your role in the course? What primary functions do you carry out? (Directive vs. non-directive, lecture, timekeeper/task master, facilitator, etc.)

4. Is this a new course for you? (Flexibility, clarity of structure, student influence)

   If yes: Do you anticipate changes as you go along? What kind? About when?

   If no: From your experience, does the course ever vary from plan? How? (pace, content, . . .) When?

4. Is this a new course for you? (flexibility, clarity of structure, student influence, . . .)

If yes: Do you anticipate changes as you go along? What kind? About when?

If no: From your experience, does the course ever vary from plan? How? (pace, content, . . .) When?

5. How do you evaluate a student in this course?

Could you describe to me what would characterize the "ideal student" coming out of your course?

Could you describe a passing but "disappointing student" coming out of your course?

If it is OK with the few students in our panel who are taking your course, would you be willing to rate them on some scale between these two descriptions - at the end of this term?

Thank you for considering these questions. Before I go would you please take a few minutes to fill out 3 questionnaires - LSI, Structure of Knowledge, Competency Profile.

APPENDIX E

STUDENT PANEL INTERVIEW PROTOCOL

STUDENT PANEL INTERVIEW PROTOCOL (initial interview)

NAME____________________________ SCHOOL______________________

Q1. SO TELL ME ABOUT YOURSELF - HOW DID YOU HAPPEN TO END UP AT CASE IN THIS FIELD?

(Probe: significant others, why SASS/ENG, aspirations for school, work, life)

Q2. HOW ARE YOU FINDING IT SO FAR?

(Probe: classes, curriculum, expectations, relations with faculty and students, campus life)

Q3. WHAT PERCENTAGE OF YOUR WAKING TIME WOULD YOU SAY YOU SPEND ON YOUR PROFESSIONAL EDUCATION?

Q4. WHEN WE TALK ABOUT LEARNING ENVIRONMENTS, WE MEAN MORE THAN JUST CLASSES (THOUGH THESE ARE IMPORTANT). WE MEAN ANY SITUATION YOU'RE OFTEN IN THAT YOU TYPICALLY LEARN THINGS FROM - THIS COULD BE SIGNIFICANT RELATIONSHIPS, ACTIVITIES, CLUBS, HOBBIES AND SO ON. WHAT DO YOU THINK WILL BE SIGNIFICANT LEARNING ENVIRONMENTS FOR YOU NEXT TERM?

(RANKING)

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

____ __________

(add classes to bottom of the list before ranking)

Q5. DO YOU HAVE A SENSE OF HAVING ANY OBJECTIVES, HOPES OR GOALS FOR THE NEXT SIX MONTHS?

(if NO go to Q6A; If YES :) WHAT ARE THEY?

(Probe: Classes, career, work, personal life)

COULD YOU RANK THESE FOR ME IN TERMS OF IMPORTANCE?

Q6. GOING BACK TO THE LEARNING ENVIRONMENTS YOU MENTIONED EARLIER (show interviewee page 2, add classes) COULD YOU RANK THESE IN TERMS OF WHICH ARE MOST IMPORTANT IN HELPING YOU ACHIEVE YOUR GOALS?

(Probe: make them discriminate between classes, ask how they link to which goals)

****

Q6A. GOING BACK TO THE LEARNING ENVIRONMENTS YOU MENTIONED EARLIER, WHICH ONES ARE MOST IMPORTANT TO YOU? CAN YOU RANK THEM IN TERMS OF IMPORTANCE?
(show them page 2, add classes)

(Probe: Why - get a sense of what they're hoping to get from this environment. What would they like to be different in six months. Make them discriminate between classes)

****

Q7. WHICH OF THESE LEARNING ENVIRONMENTS DO YOU THINK WILL BE THE MOST DIFFICULT TO DEAL WITH SUCCESSFULLY?
- THE EASIEST?
- WHY?

- MOST EXCITING?

Q8. I'D LIKE TO FINISH UP BY JUST GETTING SOME FACTS FROM YOU.

(ask those you're not sure about)

BIRTH DATE ____________________ SEX ____________

MAJOR ____________________ YEAR ____________

MARRIED/SINGLE (etc) ____________________ No. of children ____________

SPOUSE'S OCCUPATION ____________________

LIVING ARRANGEMENTS (on/off campus, at home, etc.) ____________________

IF NOT AMERICAN, HOW LONG IN U.S.? ____________

PREVIOUSLY WORKED FULL TIME? ____________

WHAT KIND OF JOB WAS THAT? ____________________

RIGHT NOW, WHAT KIND OF FIRST JOB ARE YOU SHOOTING FOR WHEN YOU LEAVE THIS PROGRAM (ENTRY JOB)?

____

____

____

9. HAND BACK LSI SCORES AND BULLSEYE GRID

Q10. WELL THAT'S ALL I NEED TO KNOW FOR NOW. DO YOU HAVE ANY QUESTIONS?

11. JANUARY EXPECTATION.

NAME

DATE

PROTOCOL FOR SECOND STUDENT INTERVIEWS, NIE

SCHOOL

1) Briefly review what we did in the first interview.

2) Show the student the environments which s/he gave during the first interview. Ask: Are there any changes you would make on this list? Probes: Would you still include the same environments, or are there ones you would add or eliminate? Would you still rank them in the same order of importance?

3) From the revised list, take the top five environments. If the student does not include the class or classes we are observing, take only the top four and include the class as the fifth; or take the top three and include two (if we are observing two) as the fourth and fifth. Make a note if you do this, and note what ranking the student has given to these environments. List here:

OTHER:

100

4) For each environment:

a) administer ACP. Push the respondant to fill in "other" blanks.

b) administer 5 point scale. Give the student sheet with scale on it and record his/her answers on matrix:

ENVIRONMENT	NOT IMP.	BORING	DIFF	COMFT

5) Ask the student to think of these five environments, and to include every other environment in a sixth category. Next, ask him/her to imagine having 100 units of energy. How would he/she divide them among these six categories in a way that is reflective of how s/he uses his/her energy in real life? Use list on preceeding page.

6) Look back to responses given in the initial interview. Generally, how is the term going so far? Is it any different than you expected? How?

7) Administer ACP relative to self.

8) Show LSI score sheets from earlier part of study.

9) Any questions?

Name ____________________

FINAL INTERVIEWS: ENGR. & SASS Panels

Overall Flow

I. For each of 5 ranked Environments:

A. Get APSB ranking of paragraphs

1. Probe after they do ranking to see if they "weight" their ranks: is #1 far above 2, 3, 4, etc.?

B. If a course, also get expected grade (if appropriate) and self ranking in class.

C. Overall Match/Mismatch questions

II. For the Environment we observed, have them fill out the rating form. Allow/encourage them to ask questions regarding meaning of our terms.

III. Summary Section

A. "Let's review your last set of goals..."

1. Do you feel you've achieved them (or well)?

- which ones?

- How have you achieved them?

- If not, why not?

Name ________________

- Any new goals already emerging?

B. Fill out ACP (left side) for your self.

1. Look at list: Which 3-5 competencies are ones you feel you have really grown/developed/improved in?*

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

*Allow them to identify areas not on our list.

2. Are there any areas you feel you have grown stale in?

3. Look at First Self Profile (Initial interview)

a. Does the data show any changes?

b. If yes - are they the same as you just said above?

c. If no - why not - or why doesn't the data reflect your feelings about your growth/change over this period.

IV. Administer LSI once more.

V. Closure - talk about feedback sessions in Sept./Oct.

INTERVIEW #3

NAME ____________________

ENVIRONMENT ____________________

Please circle the extent to which you agree or disagree with the following statements.

IN THIS ENVIRONMENT I WAS. . .	Strongly Disagree	Disagree	Agree	Strongly Agree
1. Challenged to work up to my potential	1	2	3	4
2. Able to coast - it was easy	1	2	3	4
3. Turned off, disinterested and did minimum to get by	1	2	3	4
4. Forced to work harder than I had expected	1	2	3	4
5. Turned on - I want my learning in this context to continue on.	1	2	3	4

APPENDIX F

THE PERCEPTION-REACTION TEST
AND SCORE SHEET

PERCEPTION REACTION INVENTORY

EXAMINER'S SCORE SHEET

Respondent's Name ____________

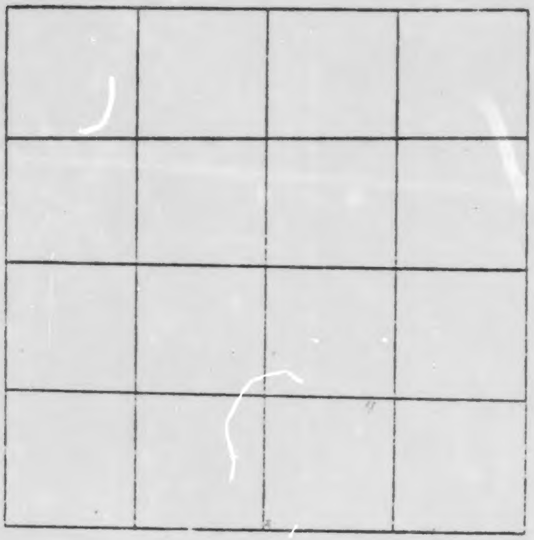
Date ___/___/_______

Examiner ________________

ITEMS	ANSWERS			Pre-solutions	Certainty	Time	TOTALS
SCORE	0	1	2	0 immediate answer 1 guess, trial answer, "no wait" 2 reflect talk to self, counting	0 definite answer 1 some hesitancy 2 great caution, uncertain	0 fast 1 medium 2 slow	
1. 16 Squares	16	17-22	22-32				
2. "F's" (Files)	3 or less	4	5,6				
3. Snail Sleep	Other answers	20 hours	13 hours				
4. Snail Top	20 inches	Other answers	"can't tell"				
5. Backward Sentence	The cat saw the rat.	Other answers	The cat was the tar.				
6. Summer	11	12-13	more than 13				
7. "F's" (Fish)	8 or less	9	10				
8. Triangles	24 or less	25-31	32				
9. 1" Square	4 inches	Other answers	"can't tell"				
10. Paris	Paris in the Spring	____	Paris in the the Spring				
11. Star	6	____	"can't tell"				
12. 8	4	4 and 3 4 and 0	3,4 & 0				
TOTALS							☐

PERCEPTION REACTION INVENTORY

The following twelve cards picture some simple and complex figures and sentences. In each case you are asked to answer a question about the figure or sentence. The person giving you the Inventory will place the cards one at a time in front of you and ask you for your answer to the question.



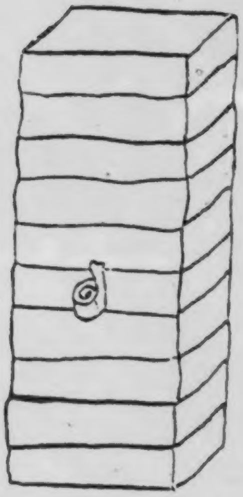
How many squares are in the above figure?

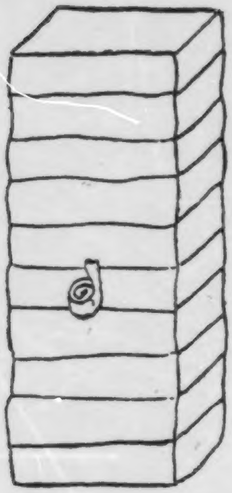
FINISHED FILES ARE THE RE-
SULT OF YEARS OF SCIENTIFIC
STUDY COMBINED WITH THE
EXPERIENCE OF MANY YEARS.

How many "F"s are in the above sentence?

A SNAIL HAS UNDERTAKEN TO CLIMB A PILE OF TEN BRICKS. IT CAN CLIMB FOUR BRICKS IN AN HOUR. BUT THEN, SINCE THE EFFORT HAS BEEN EXTREMELY TIRING, IT MUST SLEEP AN HOUR, DURING WHICH IT SLIPS DOWN THREE BRICKS.

HOW LONG WILL THE SNAIL TAKE TO REACH THE TOP OF THE PILE?





If each brick is 2 inches thick how far above the ground will the snail [illegible] when it reaches the top?

.rat eht saw tac ehT

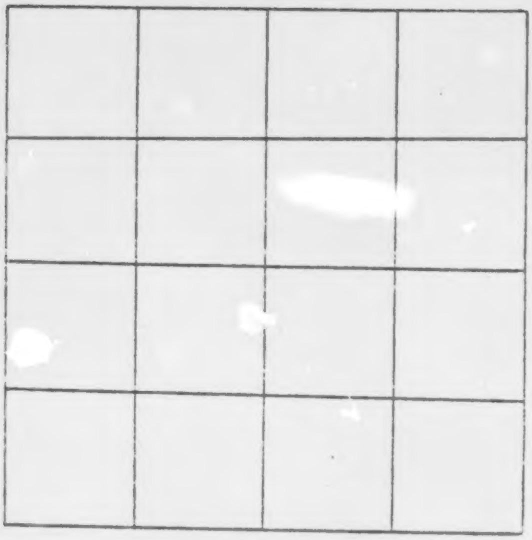
The above sentence is printed backwards. What does it say?

The first fine fishing day
of the year we finally flew
to Alaska for five days of
real fishing.

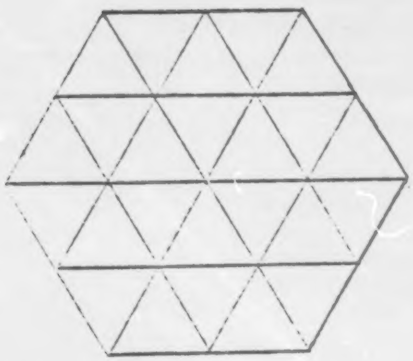
How many "f"s are in the above
sentence?

Most people prefer warm days
and cool nights in the summer.

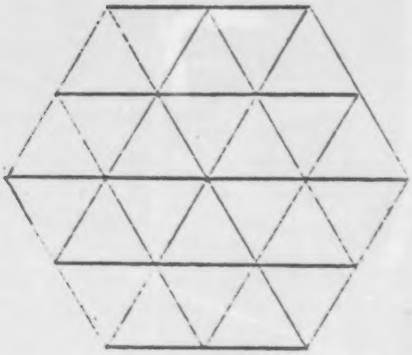
How many words are in the above
sentence?



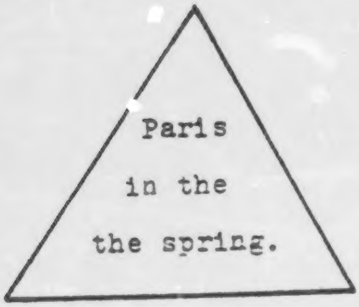
The side of a small square is 1 inch long. How long is a side of the whole figure?



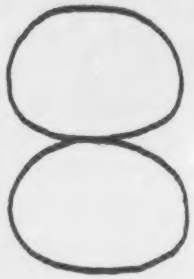
How many triangles are in the above figure?



There is a star inside the hexagon above. How many points does it have?


Paris
in the
the spring.

Read the phrase in the triangle.



½ of 8 is:

3

4

0

APPENDIX G

LEARNING ENVIRONMENT DIAGNOSTIC

LEARNING ENVIRONMENT DIAGNOSTIC

A. Purpose/Objective of activities:

These questions relate to the activities that describe and distinguish this course "in action": things that tell about the shape of events learners engage in which most typify this course setting. Based on observations and assessment of how "typical" they were, determine what the "major" aspects of the session are and answer the following:

1. To what degree is the emphasis to derive or understand a concept or relationship between concepts or events?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

2. To what degree is the emphasis on learning a skill or concept by using it to solve a problem?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

3. To what degree is the emphasis on helping the learner to realize or develop his/her attitudes toward the profession, field of study, or task at hand?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

4. To what degree is the emphasis on applying knowledge or skills to solve real life problems in ways a professional would?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

APSB Ranking

Most characteristic 1. ____

2. ____

3. ____

Least characteristic 4. ____

B. Principal focus or source of information being dealt with:

5. To what degree is the source of information being dealt with "here and now", focusing on personal feelings/ statements at the moment?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

6. To what degree is the source of information abstract of "there and then" (e.g., discussiong methods, concepts; looking at pictures, graphs of a site; reading or listening about something done in the past)?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

7. To what degree is the focus of discussion or interaction on "how" or "why" things occur or relate to one another (e.g., analyzing events)?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

8. To what degree is the focus of discussion or interaction on that necessary to organize, plan, schedule, or otherwise accomplish a task with an outcome or product?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

APSB Ranking:

Most: 1. _____
2. _____
3. _____
Least 4. _____

C. Intended Learner Behavior/Roles:

This demansion in concerned with the extent to which "rules" do or do not govern learner activities or behaviors and where these rules come from. Answer the following with respect to which characterizes the primary or major activity(ies) that constitute the course (e.g., studio time at benches; "class sessions" in breakaway room; lectures; presentations; reviews; papers).

9. To what degree are activities and communications constrained/governed by rules of inference, jargon, methods, symbols: could a stranger understand what was going on? (e.g., is it necessary for learners to memorize terms, labels, codes, data for recall; use complex graphical keys; adhere to guidelines, schedules, etc.)?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

10. To what degree are learners encouraged to observe, listen, reflect and discuss in order to try out new perspectives or ways of thinking about a subject?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

11. To what degree is the learner left to make decisions about his/her own behavior: most behavior is dependent upon previous decisions/choices s/he has made?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

12. To what degree do learners express personal opinions about or reactions to course activities or to a topic (e.g., expression of attitudes, values, aesthetic concern; evaluation of others' evaluation of content or process -- "I think, I feel that, I want to...")?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

APSB Ranking

Most 1. _____

2. _____

3. _____

Least 4. _____

D. Intended Teacher Roles: (relative to instructor's own behavior)

13. How often does the instructor serve to guide, close, or bound open-ended/abstract discussions?

1	2	3	4	5	6	7
not at all	very few times	seldom	sometimes	often	quite a lot	always

14. How often is the instructor a "coach" who guides by offering advice/reactions based on personal experience as a professional?

1	2	3	4	5	6	7
[illegible]			sometimes			always

15. How often does the instructor act as a listener, helper, or counsellor to the learner (particularly in one-on-one relationships)?

1	2	3	4	5	6	7
not at all			sometimes			always

16. How often does the instructor use his/her expertise to interpret a body of knowledge for the learner and/or to guide the learner in use of terms, rules, protocols, etc.?

1	2	3	4	5	6	7
not at all			sometimes			always

APSB Ranking:

Most 1. _____

2. _____

3. _____

Least 4. _____

Complexity Scales: For each of the following scales, note the minimum complexity required to successfully meet the task/learning objectives. While there may be more complex operations being enacted by individuals, what is the minimum that the task/learning environment requires?

							NOTES
A.	direct sensing and feeling	continuity of sensation and feeling	self aware feeling and sensing value system	differentiating self and others feeling and sensing values	relativistic appreciation of value systems	value commitment within relativism	
P.	attention	watching continuous images	reflection: giving observations personal meaning	creating alternative meaning and observation schemes	relativistic appreciation of different meaning schemes and points of view	intuition: choosing meaningful perspectives	
S.	recognizing: enactive thought	object constancy "iconic" thought	concrete symbol formation	formal hypothetico-deductive reasoning	attaching concrete menaings to symbol systems	finding and solving meaningful problems	
B.	responding to circumstances	doing: short range intentional acts toward goals	acheiving: development of clear goals and longer range strategies	risktaking: making goal & strategy trade-offs	experimental hypothesis testing: change goals & strategies based on results	responsible action: accepting unknown emergent reality	

E. Potential for Evaluation/Feedback:

This set of questions has to do with type of feedback and/or evaluation the learner gets on a session-to-session basis: not just at the end of the total course.

17. To what extent are criteria and standards based on self and others' experience of self at the moment (e.g., personalized discolsure and feedback to ascertain quality of performance)?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

18. To what degree is the learner encouraged to see or generate alternative standards or criteria of the discipline to evaluate meaningfulness of his/her performance?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

19. To what degree is performance or decisions by the learner evaluated as correct or incorrect by objective criteria based on axioms or rules of the field of knowledge?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

20. To what degree is the learner left to judge or evaluate performance for him/herself using criteria s/he chooses as valid?

1	2	3	4	5	6	7
very little degree		to some degree		to a large degree		totally

ABSP Ranking

Most 1. _____

2. _____

3. _____

Least 4. _____

JOBS PRESENT DIFFERENT KINDS AND INTENSITY OF CHALLENGE TO PEOPLE. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE PRESENT IN YOUR JOB.

5. The demands of my job continuously challenge me to learn how to get along with people better.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

6. To respond effectively to my job demands, I must continuously update myself on new technical and theoretical techniques.

1 2 3 4 5 6 7

7. I am continually challenged to learn new ways to understand how things relate to each other.

1 2 3 4 5 6 7

8. I am continually challenged by opportunities to develop a wider range of skills (lead projects, write formal proposals, negotiate with suppliers, develop software, etc.).

1 2 3 4 5 6 7

JOBS OFTEN REFLECT DIFFERENCES IN KIND AND INTENSITY WITH REGARD TO ORIENTATION TOWARD TIME AND/OR USE OF TIME. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE PRESENT IN YOUR JOB.

9. My job demands force me to stay very "present oriented."

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

10. Most of my tasks are organized according to well defined time schedules.

1 2 3 4 5 6 7

11. My job generally requires a fairly extended time frame from start to completion of major projects.

1 2 3 4 5 6 7

12. I am usually conscious of having too many activities and too little time to do all well.

1 2 3 4 5 6 7

APPENDIX H

ENVIRONMENTAL PRESS QUESTIONNAIRE

Environmental Press Questionnaire

Work abilities: (Circle the appropriate number for each item.)

To what extent do you need these competencies or work abilities to do well in this environment?

	not at all important					high level needed	
1. Listening with an open mind	1	2	3	4	5	6	7
2. Developing comprehensive plans	1	2	3	4	5	6	7
3. Building conceptual models	1	2	3	4	5	6	7
4. Committing yourself to objectives	1	2	3	4	5	6	7
5. Influencing and leading others	1	2	3	4	5	6	7
6. Making decisions	1	2	3	4	5	6	7
7. Designing experiments	1	2	3	4	5	6	7
8. Being sensitive to values	1	2	3	4	5	6	7
9. Being able to adapt to changing circumstances	1	2	3	4	5	6	7
10. Generating alternative ways of doing things	1	2	3	4	5	6	7
11. Organizing information	1	2	3	4	5	6	7
12. Setting goals	1	2	3	4	5	6	7
13. Experimenting with new ideas and approaches	1	2	3	4	5	6	7
14. Imagining implications of ambiguous situations	1	2	3	4	5	6	7
15. Identifying and defining problems	1	2	3	4	5	6	7
16. Dealing with people	1	2	3	4	5	6	7
17. Gathering information	1	2	3	4	5	6	7
18. Seeking and exploiting opportunities	1	2	3	4	5	6	7
19. Communicating with others	1	2	3	4	5	6	7
20. Analyzing quantitative data	1	2	3	4	5	6	7
21. Being sensitive to people's feelings	1	2	3	4	5	6	7
22. Being personally involved	1	2	3	4	5	6	7
23. Testing theories and ideas	1	2	3	4	5	6	7
24. Measuring and evaluating effective performance	1	2	3	4	5	6	7
25. Working in groups	1	2	3	4	5	6	7
26. Seeing how things fit in the big picture	1	2	3	4	5	6	7
27. Choosing the best solution to a defined problem	1	2	3	4	5	5	7
28. Other ________________	1	2	3	4	5	6	7
29. Other							

JOBS CAN BE CHARACTERIZED BY THE DEGREE TO WHICH THEY INVOLVE APPLYING TECHNICAL KNOWLEDGE, RELATING TO PEOPLE, CREATING NEW APPROACHES, etc. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE PRESENT IN YOUR JOB.

21. My job requires that I become aware of the feelings, values and ideas of others as I interact with them in organizational activities.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

22. My job requires a primary focus on solving problems through the use of my theoretical and analytical skills.

1 2 3 4 5 6 7

23. My job requires a primary focus on understanding how elements in my sphere of activity relate to each other (e.g., observing or reflecting on process data to derive new principles).

1 2 3 4 5 6 7

24. My job requires a primary focus on applying my skills, education, and experience to getting things done.

1 2 3 4 5 6 7

APPENDIX I

THE APSB PARAGRAPH RANKING QUESTIONNAIRE

(PRQ)

APSB Rankings

Please read the four paragraphs below and rate them in terms of which paragraph most characterises the environment (#1) next most (#2) and so on.

The primary emphasis here is on helping me to realize and/or develop my attitudes or values toward some subject, field, or phenomenon. The important information is here-and-now: my or other's feelings, emotions, opinions, etc. The situation is generally structured to allow/encourage me to express my feelings about it, or others in it. The teacher or other authority figure (if any) takes a personal concern in my development. The feedback I get is based on my and other's experience of myself in this setting.

____

The primary emphasis here is on understanding how or why things relate to one another or to some event. I am required to seek and try out new/multiple ways of looking at something. The key information is that which is focused on analyzing or explaining events, behavior, or concepts. The teacher or authority figure (if any) helps by guiding open-ended discussions and/or by setting boundaries on what to discuss, for how long, etc. I am left to generate and choose among alternative criteria to evaluate the meaningfulness of what goes on.

____

The primary emphasis here is on learning or mastering a skill or concept by using it to solve problems. The important information is abstract, often in the form of data, past events, or written word. I often need to adhere to the use of specific terminology, rules of inference, symbols, memorized information, and the like in order to participate in this setting. Evaluation is by objective criteria and usually done by the teacher or authority figure who interprets these criteria based on his/her expertise.

____

The primary emphasis here is on applying knowledge or skills to solve some real life problem. The important information is that necessary to plan, schedule, prioritize, etc. to get some job or task accomplished. There are few absolute rules. I am often left to act on my own or to take responsibility for what I do which may mean taking personal risks. The teacher or authority figure (if any) helps mainly as a coach or advisor to my plans and actions. I must ultimately judge my own performance using criteria I have accepted as meaningful.

____

If this is a course: Expected grade ________

Self ranking in class (Check one) 90-100____; 80-89 ____; 70-79 ____; 60-69 ____;Below 60th percenti
percentile

APPENDIX J

ADAPTIVE COMPETENCE PROFILE

Adaptive Competence Profile

Work abilities: (Circle the appropriate number for each item.)

At the present time, how would you rate your level of ability in the following skill areas (whether you use them in your present situation or not)?

	I am: Unskilled			Average		Highly Skilled	
1. Listening with an open mind	1	2	3	4	5	6	7
2. Developing comprehensive plans	1	2	3	4	5	6	7
3. Building conceptual models	1	2	3	4	5	6	7
4. Committing yourself to objectives	1	2	3	4	5	6	7
5. Influencing and leading others	1	2	3	4	5	6	7
6. Making decisions	1	2	3	4	5	6	7
7. Designing experiments	1	2	3	4	5	6	7
8. Being sensitive to values	1	2	3	4	5	6	7
9. Being able to adapt to changing circumstances	1	2	3	4	5	6	7
10. Generating alternative ways of doing things	1	2	3	4	5	6	7
11. Organizing information	1	2	3	4	5	6	7
12. Setting goals	1	2	3	4	5	6	7
13. Experimenting with new ideas and approaches	1	2	3	4	5	6	7
14. Imagining implications of ambiguous situations	1	2	3	4	5	6	7
15. Identifying and defining problems	1	2	3	4	5	6	7
16. Dealing with people	1	2	3	4	5	6	7
17. Gathering information	1	2	3	4	5	6	7
18. Seeking and exploiting opportunities	1	2	3	4	5	6	7
19. Communicating with others	1	2	3	4	5	6	7
20. Analyzing quantitative data	1	2	3	4	5	6	7
21. Being sensitive to people's feelings	1	2	3	4	5	6	7
22. Being personally involved	1	2	3	4	5	6	7
23. Testing theories and ideas	1	2	3	4	5	6	7
24. Measuring and evaluating effective performance	1	2	3	4	5	6	7
25. Working in groups	1	2	3	4	5	6	7
26. Seeing how things fit in the big picture	1	2	3	4	5	6	7
27. Choosing the best solution to a defined problem	1	2	3	4	5	6	7
28. Other ________________	1	2	3	4	5	6	7
29. Other ________________	1	2	3	4	5	6	7

APPENDIX K

ENVIRONMENTAL PRESS QUESTIONNAIRE

Environmental Press Questionnaire

This section has two parts: Part One focuses on task variables, and Part Two focuses on organizational variables. Each question is accompanied by a 7-point scale on which you may indicate the degree of best fit for your job. You may find that choices on this scale for some questions are more easily selected than for others. There are no "good or bad" answers. Try to respond on the basis of what you believe to be true about your job generally --not just on very unusual days. All responses should be consistent with your most objective evaluation of task and organizational variables for your present position.

Part I--Task Variables

ALL JOBS HAVE SOME DEGREE OF VARIETY WHICH VARIES BOTH IN INTENSITY AND KIND. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE PRESENT IN YOUR JOB:

1. My job requires almost continuous contact with a number of different people.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

2. My job requires the use of a wide range of symbolic tools, i.e., mathematics, theories, principles, computer simulation, etc.

1 2 3 4 5 6 7

3. My job requires that I analyze and view problems from a number of different viewpoints.

1 2 3 4 5 6 7

4. My job requires that I perform a wide range of activities, i.e., planning, scheduling, feeding data to computers, negotiating for resources, etc.

1 2 3 4 5 6 7

JOBS OFTEN VARY CONSIDERABLY IN THE KIND OF INFORMATION DEALT WITH (e.g., VOLUME, FORM, COMPLEXITY, AND SOURCE, etc.). RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE PRESENT IN YOUR JOB.

13. Most of the information I deal with is current, immediate, timely (e.g., ideas, feelings, values, committing to goals, etc.).

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

14. Most of the information I work with is abstract (e.g., charts, tables, formulae, printouts, etc.).

1 2 3 4 5 6 7

15. Most of the information I work with focuses on how the process or how something gets done (e.g., ideas about causal relationships, concern for methodology, or approaches to problems).

1 2 3 4 5 6 7

16. Most of the information I deal with focuses on the progress of some task or activity (e.g., preparing progress reports, revising schedules, getting data to or from the computer).

1 2 3 4 5 6 7

THE RELATIVE SCOPE OF PARTICULAR JOBS VARIES IN TERMS OF DEPTH AND BREADTH OF TASKS, AS WELL AS THE DEGREE TO WHICH THEY ARE WHOLE (INTEGRATED) OR FRAGMENTED. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY APPLY TO YOUR JOB.

17. The scope of my job requires frequent exposure to a variety of emotional and/or conflict issues among superiors, peers and/or subordinates.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

18. My job requires understanding of and involvement with a wide scope of technical aspects of projects.

1 2 3 4 5 6 7

19. It is part of my job to know about or anticipate the probable downstream impact and consequences of decisions made in my area.

1 2 3 4 5 6 7

20. I am involved in so many activities it is hard to keep track of progress in some areas.

1 2 3 4 5 6 7

JOBS CAN BE CHARACTERIZED BY THE DEGREE TO WHICH THEY INVOLVE APPLYING TECHNICAL KNOWLEDGE, RELATING TO PEOPLE, CREATING NEW APPROACHES, etc. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE PRESENT IN YOUR JOB.

21. My job requires that I become aware of the feelings, values and ideas of others as I interact with them in organizational activities.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

22. My job requires a primary focus on solving problems through the use of my theoretical and analytical skills.

1 2 3 4 5 6 7

23. My job requires a primary focus on understanding how elements in my sphere of activity relate to each other (e.g., observing or reflecting on process data to derive new principles).

1 2 3 4 5 6 7

24. My job requires a primary focus on applying my skills, education, and experience to getting things done.

1 2 3 4 5 6 7

Part II--Organizational Variables

ORGANIZATIONS DIFFER IN THE WAY MEMBERS RECEIVE FEEDBACK ABOUT THEIR PERFORMANCE. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY DESCRIBE YOUR ORGANIZATIONAL UNIT.

25. Feedback about my performance is personalized and based on my learning needs and career aspirations.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

26. My performance is evaluated against a specific body of knowledge or my superior's expert opinion.

1 2 3 4 5 6 7

27. I participate in establishing standards of performance and assessment criteria for my current level of performance.

1 2 3 4 5 6 7

28. My performance is evaluated against criteria of practicality, feasibility or cost effectiveness.

1 2 3 4 5 6 7

ORGANIZATIONS DIFFER IN TERMS OF THE KINDS OF BEHAVIOR OR ACTIVITIES ENCOURAGED OR DISCOURAGED. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY DESCRIBE YOUR ORGANIZATIONAL UNIT.

29. I am encouraged to freely express personal feelings, opinions and values concerning task activities and organizational processes.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

30. In my organizational unit, activities and decisions are governed by logic, standard methods, and rules of inference.

1 2 3 4 5 6 7

31. I am encouraged to spend time observing, thinking, discussing, in order to explore the meaning and relevance of elements in the task environment.

1 2 3 4 5 6 7

32. I make most of the decisions about how I schedule the use of my time on the basis of what needs to be done.

1 2 3 4 5 6 7

ORGANIZATIONS DIFFER IN TERMS OF THE DOMINANT STYLE OF SUPERIOR/SUBORDINATE INTERACTION. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE TRUE IN YOUR ORGANIZATIONAL UNIT.

33. I view my superior as a professional colleague from whom I learn by example.

1 rarely	2	3 to some degree	4	5 to a large degree	6	7 totally

34. I view my superior as a leader who provides me with expert opinions, direction, and judgment.

1 2 3 4 5 6 7

35. My superior acts mainly as a sounding board in helping me develop my own perspectives, ideas, insights, etc.

1 2 3 4 5 6 7

36. I view my superior as a "consultant" or "coach," available for advice when I need it.

1 2 3 4 5 6 7

ORGANIZATIONS VARY IN THE METHOD AND PROCEDURES THROUGH WHICH PEOPLE ARE PROMOTED. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE PRESENT IN YOUR ORGANIZATION.

37. In my organizational unit, selection and promotion decisions are discussed openly and freely.

1 rarely	2	3 to some degree	4	5 to a large degree	6	7 totally

38. In my organizational unit, selection and promotion decisions are based on objective performance criteria.

1 2 3 4 5 6 7

39. In my organizational unit, selection and promotion decisions are part of a well thought-out career planning program.

1 2 3 4 5 6 7

40. In my organizational unit, selection and promotion decisions are based on results-oriented criteria.

1 2 3 4 5 6 7

CRITERIA FOR JUDGING THE COMPETENCE OF ORGANIZATIONAL UNITS VARY, DEPENDING ON THE PURPOSES AND FUNCTIONS OF THE UNITS. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY APPLY TO YOUR ORGANIZATIONAL UNIT.

41. The effectiveness of my organizational unit is based on how well we understand and respond to the demands of people in client, customer, or user organizations.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

42. The effectiveness of my organizational unit is a function of the technical competence of the professionals in my unit.

1 2 3 4 5 6 7

43. The effectiveness of my organizational unit results from the creativity and imagination of my professional colleagues and myself.

1 2 3 4 5 6 7

44. The effectiveness of my organizational unit is judged strictly by "bottom line" results.

1 2 3 4 5 6 7

EDUCATIONAL EXPERIENCES VARY BOTH IN KIND AND FREQUENCY. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY ARE PRESENT IN YOUR ORGANIZATIONAL UNIT.

45. Educational experiences in my organizational unit result from day to day exposure to "real life" situations.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

46. Educational experiences in my organizational unit result primarily from having to learn new formulae, theories, or procedures.

1 2 3 4 5 6 7

47. Educational experiences in my organizational unit result primarily from observation of systems and reflection on results of experimentation.

1 2 3 4 5 6 7

48. Educational experiences in my organizational unit result from having to assume new responsibilities.

1 2 3 4 5 6 7

APPENDIX L

DATA ON THE SEMANTIC DIFFERENTIAL

All engineering students on the panel filled out a 12 item semantic differential for each of their top five environments during the second interview. Responses were obtained from all nine panel members for a total of 45 environments.

Items were selected from thse used by Osgood et al (1957) showing teh highest corelations on Osgood's three factors; good-bad, strong-weak and active passive. Four items from each of these factors were used.

Factor analysis of the engineers' responses revealed a different clustering of items than that expected. This is consistent however, with other studies where a semantic differential scale is used for something other than verbal concepts. Typically, these studies get different factors than those reported by Osgood (Osipow, 1968).

Loadings on each factor for each item from an analysis using a varimax rotation are shown in the following table. A quartimax rotation produced the same factors.

Semantic differential data on one engineering course from all students in that course were also available. The same facto analysis was performed on this data. The same factors were obtained but with a difference. The third factor accounted for most of the variance, while the first factor accounted for the least. It's as though the key factor students view courses through is "fun-work". Whereas for all learning environments, from family to work, the key factor is "challenging-dull".

Needless to say, these factor names were chosen arbitrarily. We leave it to the reader to judge their appropriateness.

NAME ______________________ ENVIRONMENT ______________________

DATE ______________________

The purpose of this form is to measure the meanings of certain things to various people by having them judge them against a series of descriptive scales. In filling out this form, please make your judgements on the basis of what these things mean to you. Here we are interested in what this learning environment means to you. You are to rate this environment on each of the scales in order.

Here's how you should use the scales

3 = very closely related
2 = quite closely related
1 = only slightly related
0 = neutral, equally associated, or completely irrelevant

Make sure you circle a number for every scale, do not omit any and never circle more than one number per scale. Some of the words may have no logical relationship but don't puzzle over these. It is your first impressions, the immediate "feelings" about the items, that we want.

1.	nice	3	2	1	0	1	2	3	awful
2.	light	3	2	1	0	1	2	3	heavy
3.	hard	3	2	1	0	1	2	3	soft
4.	active	3	2	1	0	1	2	3	passive
5.	unpleasant	3	2	1	0	1	2	3	pleasant
6.	sharp	3	2	1	0	1	2	3	blunt
7.	bad	3	2	1	0	1	2	3	good
8.	fast	3	2	1	0	1	2	3	slow
9.	weak	3	2	1	0	1	2	3	strong
10.	clean	3	2	1	0	1	2	3	dirty
11.	excitable	3	2	1	0	1	2	3	calm
12.	large	3	2	1	0	1	2	3	small

APPENDIX M

MEASURES OF JOB PRESS

MEASURES OF JOB PRESS

The items for each type of job press are drawn from Griggs' Environmental Press Inventory (EPI) and Kolb's Job Characteristics Index (JCI).

Scale:

1	2	3	4	5	6	7
Rarely		To Some Degree		To A Large Degree		Totally

Symbolic Complexity

($\bar{x}$ 4.54)

From the EPI:

- My job requires the use of a wide range of symbolic tools, i.e., mathematics, theories, principles, computer simulation, etc.
- To respond effectively to my job demands, I must continuously update myself on new technical and theoretical techniques.
- My job requires understanding of and involvement with a wide scope of technical aspects of projects.
- My job requires a primary focus on solving problems through the use of my theoretical and analytical skills.
- Most of the information I work with is abstract (e.g., charts, tables, formulae, printouts, etc.).

THE GENERAL "CHARACTER" OR "PERSONALITY" OF ORGANIZATIONS VARIES. RATE THE FOLLOWING STATEMENTS ACCORDING TO THE DEGREE TO WHICH THEY DESCRIBE YOUR ORGANIZATIONAL UNIT.

49. My organizational unit is primarily oriented toward people and service.

1	2	3	4	5	6	7
rarely		to some degree		to a large degree		totally

50. My organizational unit is highly "problem solving" and/or "task oriented."

1 2 3 4 5 6 7

51. My organizational unit is sophisticated in its theoretical orientation.

1 2 3 4 5 6 7

52. My organizational unit is characterized by a commitment to practical results.

1 2 3 4 5 6 7

Affective Complexity

$(\bar{x}\ 4.73)$

From the EPI:

- My job requires almost continuous contact with a number of different people.
- The demands of my job continuously challenge me to learn how to get along with people better.
- The scope of my job requires frequent exposure to a variety of emotional and/or conflict issues among superiors, peers and/or subordinates.
- My job requires that I become aware of the feelings, values and ideas of others as I interact with them in organizational activities.
- Most of the information I deal with is current, immediate, timely (e.g., ideas, feelings, values, committing to goals, etc.).

From the JCI:

My job requires:

- Being personally involved.
- Dealing with people.
- Being sensitive to peoples' feelings.
- Being sensitive to values.

APPENDIX N

JOB SATISFACTION MEASURE

JOB SATISFACTION MEASURE

A. To what extent are you satisfied in your job with:

Scale:

1	2	3	4	5	6	7
Dissatisfied						Satisfied

- Nature of the task.
- Value of the service.
- Quality of the supervision.
- Relations with people.
- Weight of the work load.
- Opportunities for advancement.
- Security.
- Freedom to use personal judgment/initiative.
- Chance to grow and develop.
- Pay and benefits.

B. Do you feel properly placed in your present position?

1	2	3	4
Feel under-utilized	Feel incorrectly placed	Feel properly placed for the time being	Feel properly placed

	Factor 1	Factor 2	Factor 3
	challenging-dull	bad-good	fun-work
sharp-blunt	.783	-.304	.047
fast-slow	.754	-.192	.256
large-small	.666	-.011	.358
excitable-calm	.863	-.095	.273
bad-good	-.077	.911	-.389
unpleasant-pleasant	-.063	.941	-.256
weak-strong	-.460	.806	-.036
hard-soft	-.506	.609	-.256
nice-awful	.407	-.319	.788
light-heavy	.629	-.438	.618
active-passive	.104	-.443	.618
clean-dirty	.339	-.097	.861
% of variance	59.6	15.2	10.9

APPENDIX O

ROLE-RELATED TENSION INDEX

ROLE-RELATED TENSION INDEX

All of us occasionally feel bothered by certain kinds of things in our work. I'm going to read a list of things that sometimes bother people, and I would like you to tell me how frequently you feel bothered by each of them.

Scale:

1	2	3	4	5
Never	Rarely	Sometimes	Rather Often	Nearly All the Time

	Item Mean
1. Feeling that you have too little authority to carry out the responsibilities assigned.[3]	2.58
2. Being unclear on just what the scope and responsibilities of your job are.[1]	2.56
3. Not knowing what opportunities for advancement or promotion exist for you.[1]	2.92
4. Feeling that you have too heavy a work load which you can't possibly finish during an ordinary work day.[2]	3.53
5. Thinking that you'll not be able to satisfy the conflicting demands of various people.[2]	2.98

---

[1] Items incorporated in the Tension from Role-Ambiguity scale.

[2] Items incorporated in the Tension from Role-Overload scale.

[3] Items incorporated in the Tension from being Blocked in One's Career Development scale.

From the JCI:

My job requires:

- Experimenting with new ideas and approaches.
- Creating new ways of thinking and doing.
- Generating alternative ways of thinking and doing.
- Analyzing quantitative data.
- Designing experiments.
- Testing theories and ideas.
- Building conceptual models.

Behavioral Complexity

($\bar{x}$ 4.68)

From the EPI:

- My job requires that I perform a wide range of activities, i.e., planning, scheduling, feeding data to computers, negotiating for resources, etc.
- Most of the information I deal with focuses on the progress of some task or activity (e.g., preparing progress reports, revising schedules, getting data to or from the computer).
- I am involved in so many activities it is hard to keep track of progress in some areas.

From the JCI:

My job requires:

- Seeking and exploiting opportunities.
- Committing myself to objectives.
- Making decisions.
- Setting goals.

APPENDIX P

ALIENATION MEASURE

ALIENATION MEASURE

The items for the Alienation Measure were drawn from Griggs' EPI.

Scale*:

1	2	3	4	5	6	7
Rarely		To Some Degree		To A Large Degree		Totally

- I participate in establishing standards of performance and assessment criteria for my current level of performance.
- I am encouraged to freely express personal feelings, opinions, and values concerning task activities and organizational processes.
- In my organizational unit, activities and decisions are governed by logic, standard methods, and rules of inference.
- I am encouraged to spend time observing, thinking, discussing, in order to explore the meaning and relevance of elements in the task environment.
- In my organizational unit, selection and promotion decisions are discussed openly and freely.
- In my organizational unit, selection and promotion decisions are part of a well thought-out career planning program.
- My organizational unit is primarily oriented toward people and service.

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*While the respondents answered 1-7 as shown on this scale, for computations the numbers were reversed so that higher numbers represent greater alienation.

C. How much scope do you feel you have in shaping your job?

1	2	3	4
Virtually no scope	Some scope with evident restraints	Considerable scope for personal definition of job and determination of priorities	Very extensive scope or total scope for personal definition

D. Effort expended in a job, like climbing a mountain, can result in either exhilaration or simply fatigue, or both. How do you find the effort expended in your job?

1	2	3	4	5	6	7
Almost entirely fatigue						Almost entirely exhilaration

		Item Mean
6.	Feeling that you're not fully qualified to handle your job.	2.22
7.	Not knowing what your supervisor thinks of you, how he evaluates your performance.	2.39
8.	The fact that you can't get information you need to carry out your job.[1]	2.77
9.	Having to decide things that affect other individuals whom you know.	2.31
10.	Feeling that you may not be liked and accepted by the people you work with.	2.01
11.	Feeling unable to influence your immediate supervisor's decisions and actions that affect you.	2.53
12.	Not knowing just what the people you work with expect of you.	2.38
13.	Thinking that the amount of work you have to do may interfere with how well you do it.[2]	3.05
14.	Feeling that you have to do things on the job that are against your better judgment.	2.11
15.	Feeling that your job tends to interfere with your family life.	2.45
16.	Feeling that your progress on the job is not what it should be or could be.[3]	2.84
17.	Thinking that someone else may get the job above you, the one you are directly in line for.	2.07
18.	Feeling that you have too much responsibility and authority delegated to you by your superiors.	1.74

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[1] Items incorporated in the Tension from Role-Ambiguity scale.

[2] Items incorporated in the Tension from Role-Overload scale.

[3] Items incorporated in the Tension from being Blocked in One's Career Development scale.